Energy & Petroleum Regulatory Authority

ENERGY & PETROLEUM STATISTICS REPORT

2021

FOREWORD

The Energy and Petroleum Regulatory Authority (EPRA) is established under the Energy Act, 2019. The Authority is responsible for economic and technical regulation of the electricity, renewable energy, petroleum sub-sectors and coal pursuant to Section 10(jj) of the Energy Act, 2019, collecting and maintaining energy data.

Kenya's Energy Sector has experienced tremendous growth and development since independence with paradigm shifts occurring over time in the regulations and structures of utilities in both the electricity and petroleum sub-sectors. The country has emerged as a leader in the adoption of renewable energy in Africa and beyond. The guiding policies and regulatory frameworks that have led to a revamped and highly effective energy sector include; Sessional Paper No. 4 of 2004, Vision 2030, the Energy Act 2006 (superseded by the Energy Act, 2019) and the Petroleum Act, 2019. These statutes have not only guided investments in the sector, but also enhanced sector regulation, efficiency, energy security and sustainable development.

The Covid-19 pandemic negatively affected energy consumption globally. The global energy demand declined significantly as governments imposed restrictions to contain the spread of the virus adversely affecting key economic sectors. In Kenya, the actual generation of power declined during the earlier months of Covid-19 announcement in the country. This was mainly between July and October 2020 as businesses embarked on remote working or shut down. However, this trend was reversed beginning November 2020 as government eased restrictions and ramped up vaccines with the peak demand hitting 1994MW in June 2021 up from 1926MW in February 2020. The rate of connectivity was at 76.49% as at June 2021 making the country one of the global leaders in increasing electrification.

It is my hope that this report will provide critical information and statistics in the energy and petroleum sectors in the country to enhance the quality of decision-making. I am convinced that the report will be a key guide to investors and the public on major developments and emerging issues in the sector for the prosperity and wealth of the nation and her people.

Daniel Kiptoo
Director General

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ABBREVIATIONS AND ACRONYMS

AGO	Automotive Gas oil
AGOL	Africa Gas &Oil Limited
CMA	Capital Markets Authority
EPRA	Energy and Petroleum Regulatory Authority
ERC	Energy Regulatory Commission
ERI	Electricity Regulatory Index
FCC	Fuel Cost Charge
FERFA	Foreign Exchange Rate Fluctuation Adjustment
GDP	Gross Domestic Product
GWh	Giga-Watt hour
HHI	Herfidahl Hirschman Index
IPP	Independent Power Producer
LPG	Liquefied Petroleum Gas
LTWP	Lake Turkana Wind Power
MWh	Mega-Watt hour
NOCK	National Oil Corporation of Kenya
NSC	Network Service Contract
KETRACO	Kenya Electricity Transmission Company
KNBS	Kenya National Bureau of Statistics
KPC	Kenya Pipeline Company
KRA	Kenya Revenue Authority
PPA	Power Purchase Agreement
RGI	Regulatory Governance Index
RSI	Regulatory Substance Index
ROI	Regulatory Outcome Index

1
INTRODUCTION AND BACKGROUND

1. The Energy and Petroleum Regulatory Authority (EPRA) is established under the Energy Act, 2019 as a single sector regulatory agency responsible for economic and technical regulation of the electricity, renewable energy, petroleum sub-sectors, and coal. The core mandates of the Authority include tariff setting and review, licensing, enforcement, dispute resolution, approval of Power Purchase Agreements (PPA's) and Network Service Contracts. The Authority is also mandated to oversee the regulation of the upstream petroleum and gas sectors.

2. The Authority's key objectives and functions regarding Sections 10(ii) and 10(jj) of the Energy Act, 2019, is to monitor, ensure implementation of, and observance of the principles of fair competition in the energy sector in coordination with statutory authorities. The Authority is also required to provide such information and statistics to the Cabinet Secretary as may from time to time be required. The Authority also collects and maintains energy data.

3. The key statistics captured in this Report include energy supply, energy demand, energy balance, energy prices, competition, market shares and energy trading.

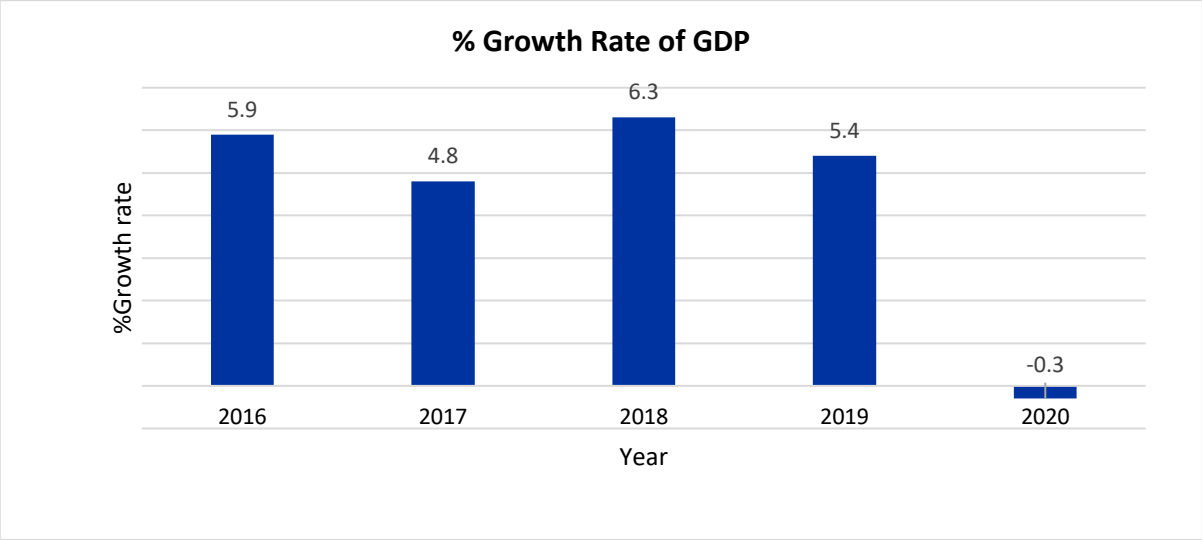
4. The Energy Statistics Report 2021, therefore, provides key data to inform policy makers, the public, investors, academia and consumers on emerging issues in the energy sector. The Report captures key statistics in electricity, petroleum and renewable energy subsectors and other issues in the energy and petroleum sectors. These statistics will enable the Authority to continously develop and implement facilitative frameworks in line with achieving the Country's Big Four (4) Agenda and subsequently, Vision 2030.

1.1 The Kenyan Economy

5. Kenya's economy was adversely affected by the COVID-19 pandemic and the consequent containment measures both domestically and internationally significantly slowing down economic activities in 2020. During the review period, the government's priority was premised on the need to safeguard the lives of Kenyans while at the same time cushioning the economy from the effects of the COVID-19 pandemic. Consequently, the health crisis required the introduction of temporal restrictive measures to curb the spread of the virus resulting to serious negative impacts on some key sectors of the economy. The temporal measures included ban of local and international travel, overnight curfew, cessation of movement in and out of some counties and zones, closure of educational facilities, leisure and eating places.

6. The restriction in movement and the need for social distancing led to disruption in labour supply while a reduction in household disposable incomes led to reduced demand for goods and services. Accordingly, many businesses especially those related to tourism and educational activities closed during the second quarter of 2020. Pick up of economic activities resumed in the third quarter of 2020 though not to a full extent. Further improvements were notable during the fourth quarter of 2020 but by and large the containment measures constrained the economy from realizing its full potential. Real Gross Domestic Product (GDP) was estimated to have contracted by 0.3 per cent in 2020 compared to a revised growth of 5.0 per cent in 2019 (Economic Survey 2021). This is summarized in Figure 1 below.

Figure 1: Trend in GDP Growth 2016-2020



Source: KNBS

7. The agricultural sector benefitted from favorable weather conditions that prevailed for the better part of the year though the sector's growth was constrained by a contraction in forestry activities. The construction sector's growth was largely buoyed by the continued investment in public infrastructure during the period under review as evidenced in a sharp increase in demand for construction materials. The health sector was mainly driven by the national and county governments' spending on COVID-19 mitigation measures. In addition, the economy was shielded from a steeper slump by strong performances in financial and insurance, public administration and information and communication activities.

8. The energy sector contracted by 0.5 per cent in 2020 compared to a 1.7 per cent growth recorded in 2019. The decelerated growth was attributed to decline in total electricity generated from 11,620.7 GWh in 2019 to 11,603.6 GWh in 2020. This was due to lower demand from large scale consumers. During the period under review, 92.3 per cent of electricity was generated from renewable sources. The sector's growth was supported by hydro generation which increased by 32.1 per cent to 4,332.7 GWh due to sufficient rainfall during the period under review. Thermal and wind generation however declined by 42.6 per cent to 754.5 GWh and 14.8 per cent to 1,331.4 GWh, respectively in 2020. In addition, electricity imports declined by 35.5 per cent to 136.7 GWh in 2020 while exports slightly increased by 2.1 per cent to 16.5 GWh.

2.
STATISTICS FOR THE ELECTRICITY SUB-SECTOR

9. The electricity sub-sector in Kenya has witnessed various reforms that have led to efficiency and revamped competition. Electricity generation is completely unbundled with increased private sector participation while electricity transmission is undertaken by both Kenya Power and the Kenya Electricity Transmission Company (KETRACO). The distribution segment is mainly carried out by Kenya Power. However, a number of mini-grids have been licensed to supply to customers in marginalized areas and selected gated communities.

2.1 Installed Electricity Capacity in Kenya

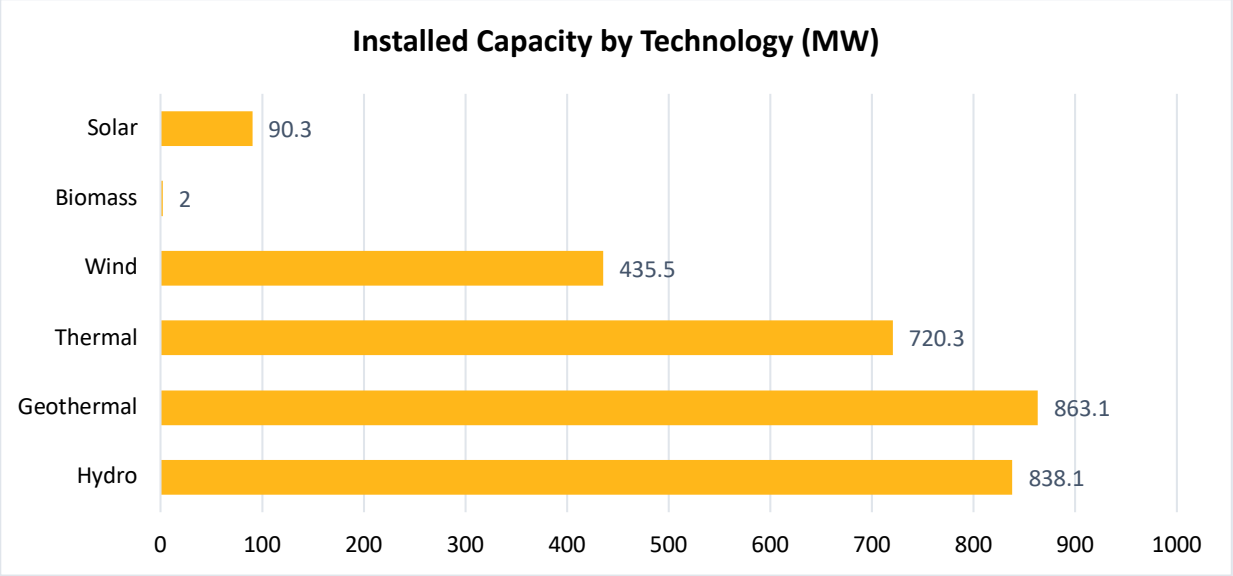
10. The total system interconnected capacity increased from 2,788MW in January 2020 to 2949.3 MW in May 2021 with an effective capacity of 2,788.4 MW. The total installed capacity with the inclusion of off-grid power was recorded at 2984MW as at May 2021.This was mainly driven by the commissioning of Kipeto Energy Limited's 100MW wind power plant, 0.5 MW Hydropower plant by Kianthumbi Hydro and 40MW Solar Power plant by Selenkei Energy Limited. Table 1 below presents an analysis of the installed electricity capacity by technology.

Table 1: Installed and Effective Capacity June 2021

`	Installed MW	Effective MW	%contribution (Effective)
Hydro	838.1	809.1	28.9%
Geothermal	863.128	805.1	28.7%%
Thermal (MSD)	660.32	640.4	22.9%
Thermal (GT)	60	56	2.%
Wind	435.5	375.5	13.4%
Biomass	2	2	0.07%
Solar	90.25	90.3	3.2%
Interconnected System	2949.3	2788.4	99.5%
Off grid thermal	31.5	21.3	0.76%
Off grid wind	0.55	0	0.00%
Off grid solar	2.26	1.902	0.07%
Imports	0	0	0.00%
Total Capacity MW	2984	2802	100.00%

Source: KPLC

Figure 2: Installed Capacity (MW) Technology June 2021



Source: KPLC

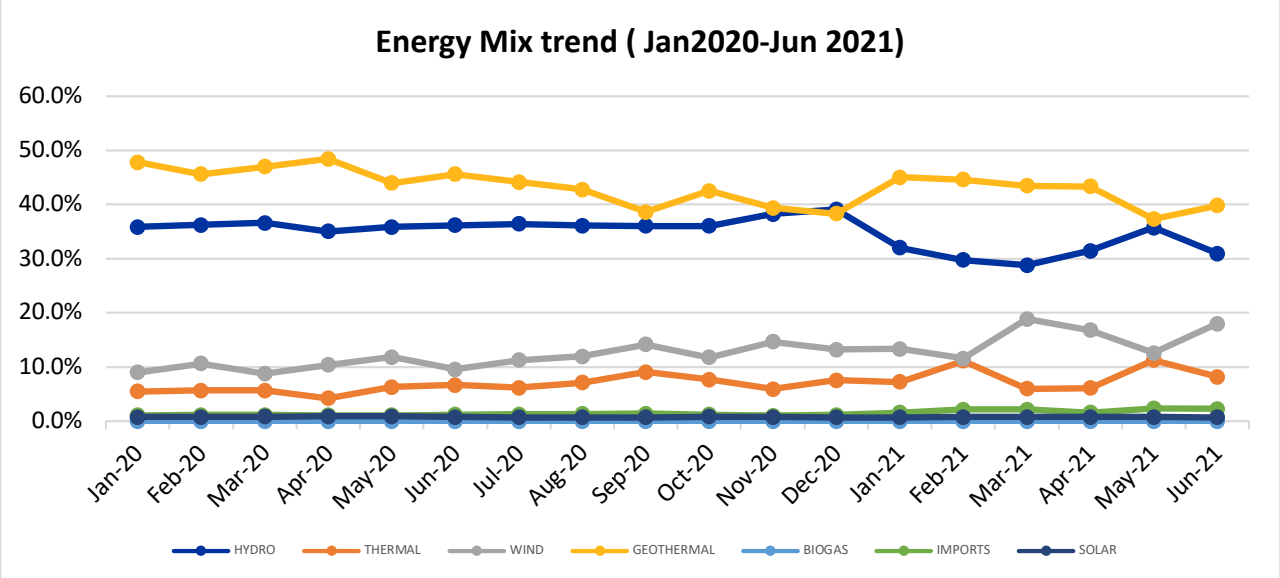
2.2 Power Generation

11. During the period under review, 92.3 per cent of electricity was generated from renewable sources. Electricity generation from geothermal, hydro and wind power sources accounted for 43.6, 36.5 and 11.5 per cent of electricity, respectively in 2020. Generation of electricity from thermal sources, the only non- renewable source accounted for 6.5 per cent of total electricity generation in 2020.

12. The commissioning of Kipeto Energy Ltd.'s Wind Power Plant with a nameplate capacity of 100MW cemented the success of wind power development. Further, renewable energy generation got a boost with commissioning of additional Selenkei Solar and Kianthumbi Hydro power plants, with installed capacities of 40MW and 0.5MW respectively.

13. KenGen has 4 ongoing geothermal projects with a total estimated capacity of 314 MW and Gitaru solar power project with an estimated capacity of 42.5 MW. Figure 3 below provides an analysis of the electricity generation mix by technology between January 2020 and June 2021.

Figure 3: Energy mix trend January 2020-June 2021



Source: KPLC

Table 2: Energy Purchased in (Gwh)

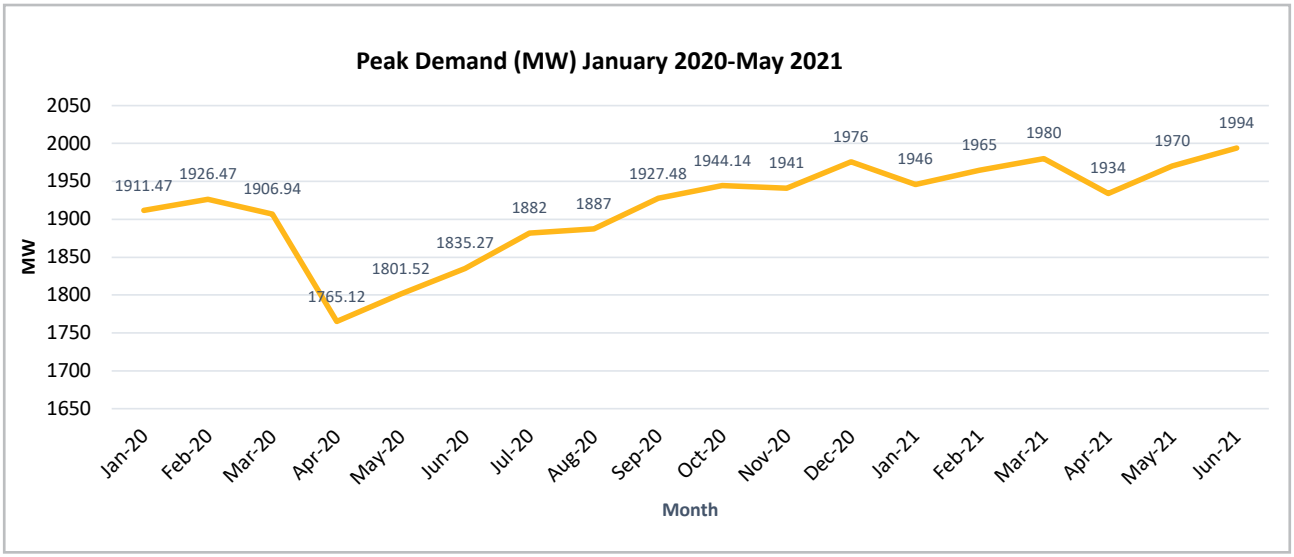
Energy Purchased GWh	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Hydro	3,310	3,787	3,341	3,224	3,741	3,693	4142.18
Geothermal	4,060	4,609	4,451	5,053	5,033	5,352	5455.13
Thermal	1,715	1,246	2,164	2,202	1,298	88	1001.87
Cogeneration	14	0	1	4	0	0	0.31
Solar	1	1	1	0	60	91	87.94
Wind	38	57	63	47	1,192	1,284	1788.9
Imports	79	67	184	171	170	161	196.55
Total	9,217	9,767	10,204	10,702	11,493	11,462	12,101.16

Source: KPLC

2.3 Analysis of Electricity Peak Demand

14. Analysis of electricity demand shows that it increased from 1911MW in January 2020 to 1926MW in February 2020, decreasing to 1906 MW in March 2020. The onset of COVID-19 pandemic in the second half of the 2019/20 financial year and subsequent government containment measures created economic shocks, adversely affecting the energy sector. During this period, peak electricity demand declined from 1,926MW in February 2020 to 1,765MW in April 2020, a decline of 9.1%. The steep decline was followed by a gradual recovery as the government eased the containment measures enabling resumption of various economic activities. Peak electricity demand improved continually and attained the pre-COVID level in October 2020.The Peak demand was recorded at 1994MW on 8th June 2021 against a total installed capacity of 2984 MW. This represents an increase of 3.5% from the 1926MW peak recorded in February 2020. This is as shown in Figure 4 below.

Figure 4: Trend in Peak Demand January -June 2021



Source: KPLC

2.4 Reliability Indices

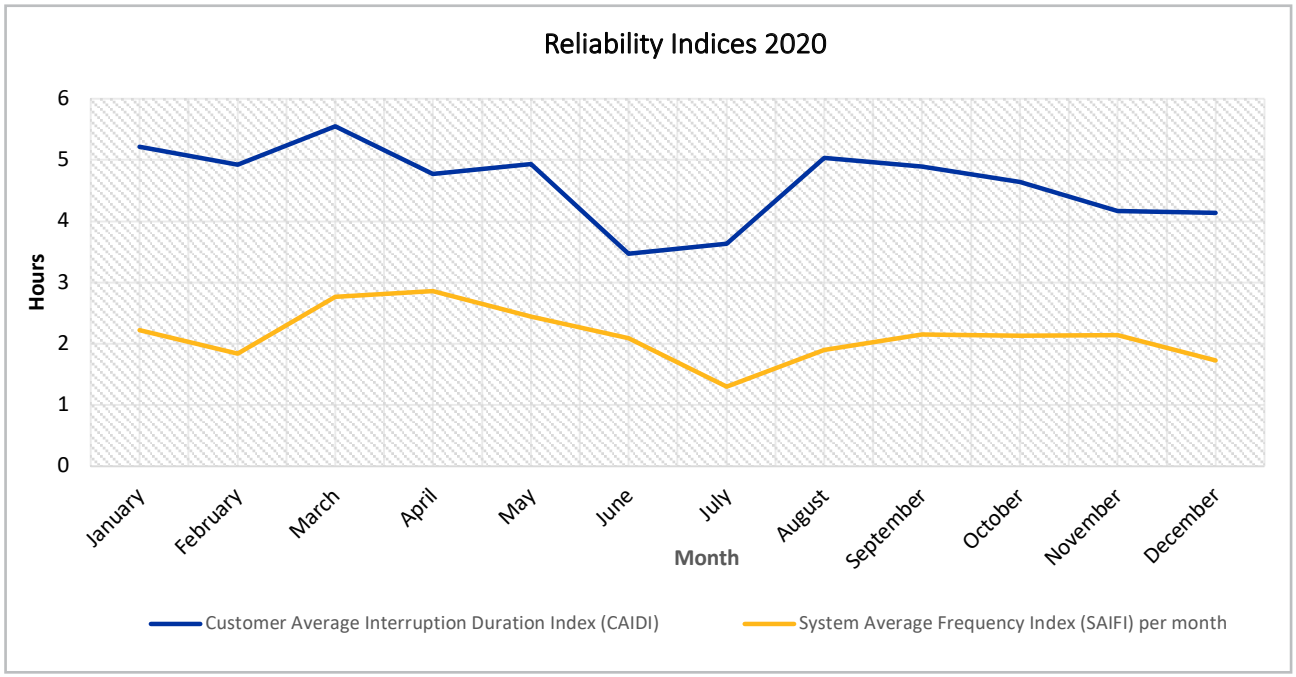
15. The Authority uses the System Average Interruption Frequency Index (SAIFI) and Customer Average Interruption Duration Index (CAIDI) to measure the reliability of power supply in the country.

$$SAIFI = \frac{\textit{Total Number of Customer Interruptions per reporting period}}{\textit{Total Number of Customers Served per reporting period}}$$

$$CAIDI = \frac{\textit{Sum of customer interruption durations per reporting period}}{\textit{Total number of customers interrupted per reporting period}}$$

16. Statistically, the country has enjoyed reliable power supply by the single power distributor, Kenya Power. Between the periods of January 2020 to December 2020, the average SAIFI was 2.13, while CAIDI was 4.613 over the same period. The Low SAIFI and CAIDI recorded over the period is a manifestation of the vast upgrade of the transmission and distribution system by the government. Figure 4 shows the SAIFI and CAIDI for the year 2020. The high loss of power is a clear indication that much more needs to be done to improve on reliability of power supply to customers as well. Figure 5 below shows the trend in Reliability indices January-December 2020.

Figure 5: Trend in Reliability Indices January-December 2020

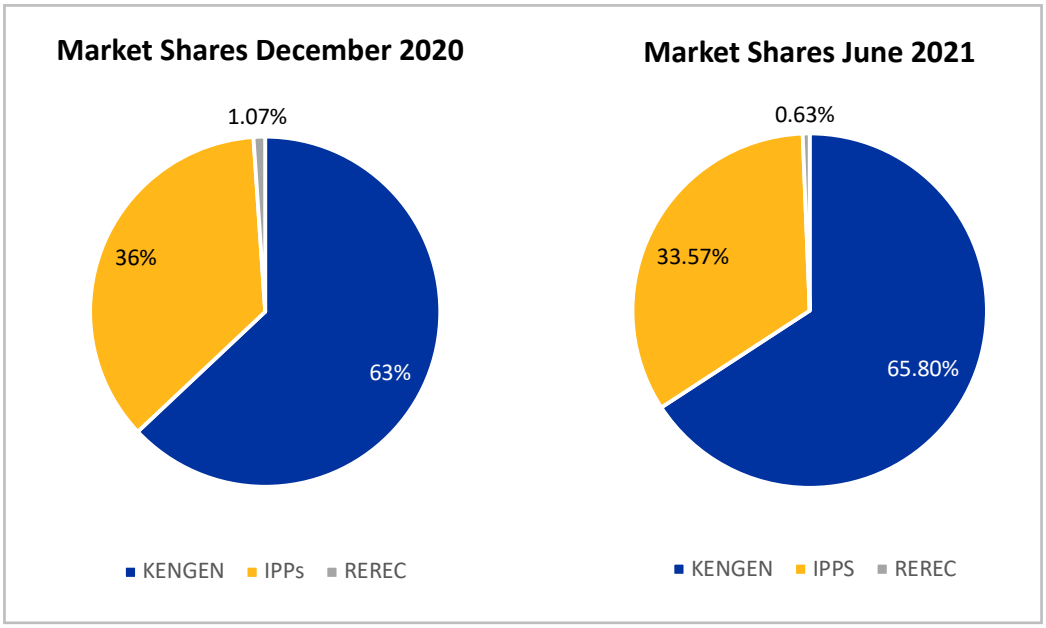


Source: KPLC

2.5 Competition Analysis and Market Share Data

17. KenGen, the largest power generator in the country currently, accounts for 62.98% of the industry's effective generation capacity. The Independent Power Producers (IPPs) account for 35.95% while Isolated grid generation under the Rural Electrification Program (REP), implemented by REREC, account for about 1.07%. KENGENS share of the electricity generation increased to 65.8% while IPPs share slightly decreased to 33.57% in June 2021. REREC's share decreased to 0.63% in June 2021. This is attributable to the fair regulation and conducive Energy policies boosting private investments in electricity generation. The figure 6 below shows the market share of the electricity sector in Kenya.

Figure 6: Market Share of the Electricity Subsector December 2020 and June 2021



Source: EPRA

The Herfindahl Hirschman Index

18. The Herfindahl Hirschman Index is a statistical measure of concentration of firms in a market that gives insight on the market structure as well as state of competition. The HHI accounts for the number of firms in a market as well as the concentration by incorporating the relative size of all firms in the market. It is calculated by squaring the market shares of all firms in the market and summing the squares as follows:

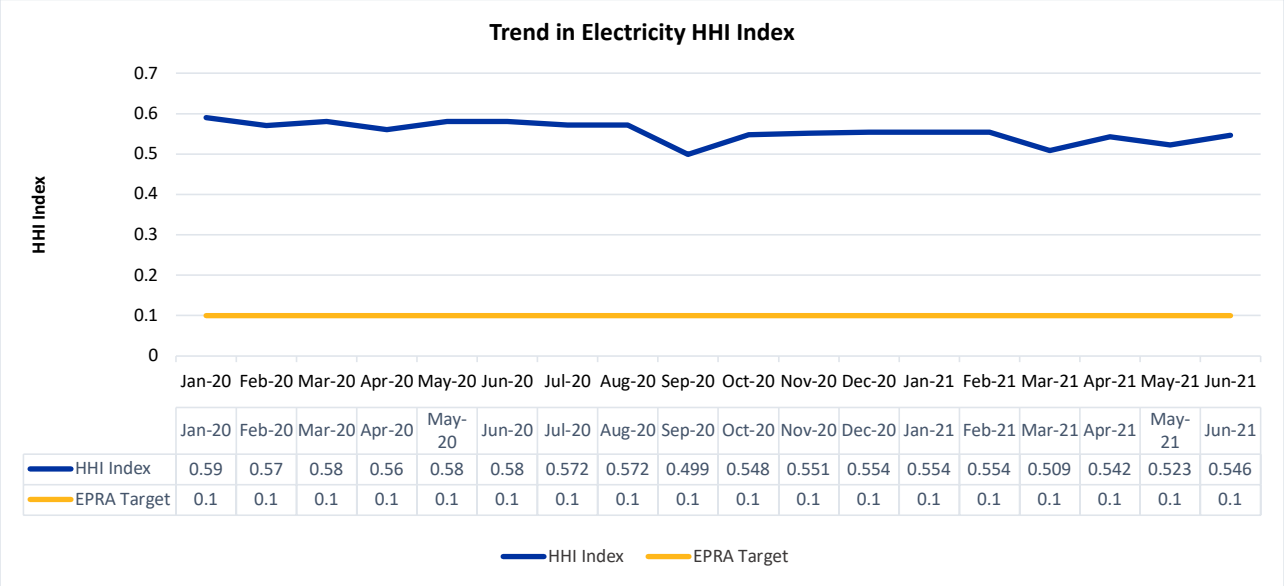
$$HHI = \sum_{i=1}^{K} (MS_i)^2$$

Where, MSi represents the market share of the ith firm and k represents the total number of firms in the market.

19. The HHI gives a much heavier weight to firms with large market shares due to the squaring effect. This corresponds to the theoretical notion in economics that the greater the concentration of output in a small number of firms, the greater the likelihood that ceteris paribus, competition will be weak and the lower the concentration of output the greater the likelihood that ceteris paribus, competition will be strong. The HHI reaches a maximum value of 10,000 (if shares are in percentage form) or1 (if market shares are in fractional form).

20. Based on the above analysis, the average HHI index for electricity power generation stood at 0.53 by December 2020 compared to 0.54 in June 2020. This is above the threshold of 0.1 that the Authority expects. KenGen has market power in the generation segment of the power market. The increased HHI Index for the electricity market was attributed to KenGen's commissioning of an additional geothermal plant i.e. Olkaria V 172MW Plant as well as the decommissioning of one of Iberafrica's power plant of 56MW after expiry of the Power Purchase Agreement (PPA). Figure 7 below shows the trend in Electricity HHI.

Figure 7: Electricity HHI Trend Jan 2020-May 2021



	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
HHI Index	0.59	0.57	0.58	0.56	0.58	0.58	0.572	0.572	0.499	0.548	0.551	0.554	0.554	0.554	0.509	0.542	0.523	0.546
EPRA Target	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Source: EPRA

- *An index below 0.1 indicates low concentration*
- *An index between 0.1 and 0.18cindicates moderate concentration*
- *An index above 0.18 indicates high concentration*

2.6 Evolution of Electricity Tariffs

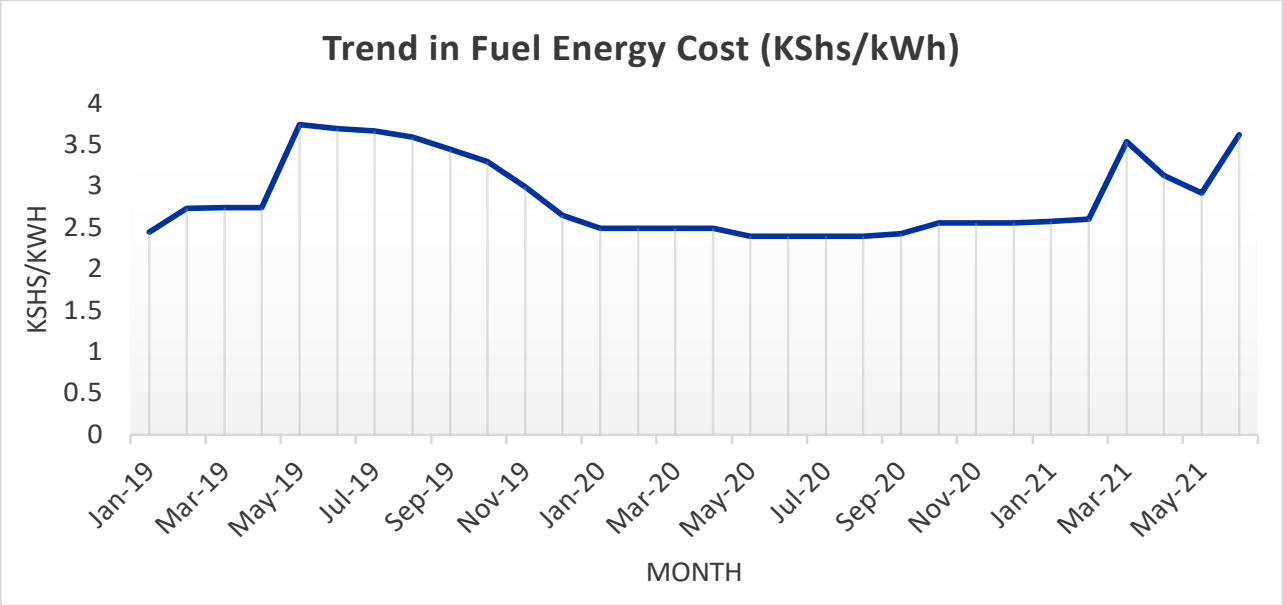
21. The evolution of electricity retail tariffs has had mixed performance during the period under review. The electricity tariff mainly comprises the non-fuel tariffs; value added tax, levies, and Pass-through Costs that increase Fuel Energy Cost (FEC), Foreign Exchange Rates Fluctuations Adjustments (FERFA), Water Resource Management Authority (WARMA) levy and Inflation Adjustments and taxes.

22. The monthly fuel cost pass-through charges is managed by EPRA as approved in the electricity retail tariffs. The FEC rate is computed monthly, but the applicable charge is set at an agreed level to mitigate against any sharp increases in electricity prices. When the computed FEC is above the set cost, the charge to customers is maintained at the set cost. Any amount not recovered by the generating company is recovered in subsequent months during periods of improved hydrology when the FEC falls below the set cost.

2.6.1 The Fuel Energy Cost

23. In January 2019, the FEC recorded was 2.45 Ksh/kWh, increasing to 2.74 Ksh/kWh and 2.75Ksh/kWh in February and March 2019 respectively. FEC reached an all-time high in May 2019 at 3.75 Ksh/kWh then continued to decline closing the year in December 2019 at 2.65 Ksh/kWh. FEC remained stable throughout the year 2020. Figure 8 shows the Fuel Energy Charge for the period January 2019 to June 2021.

Figure 8: Trend in Fuel Cost Charge Jan 2019-May 2021



Source: EPRA

2.7 Electricity Consumption

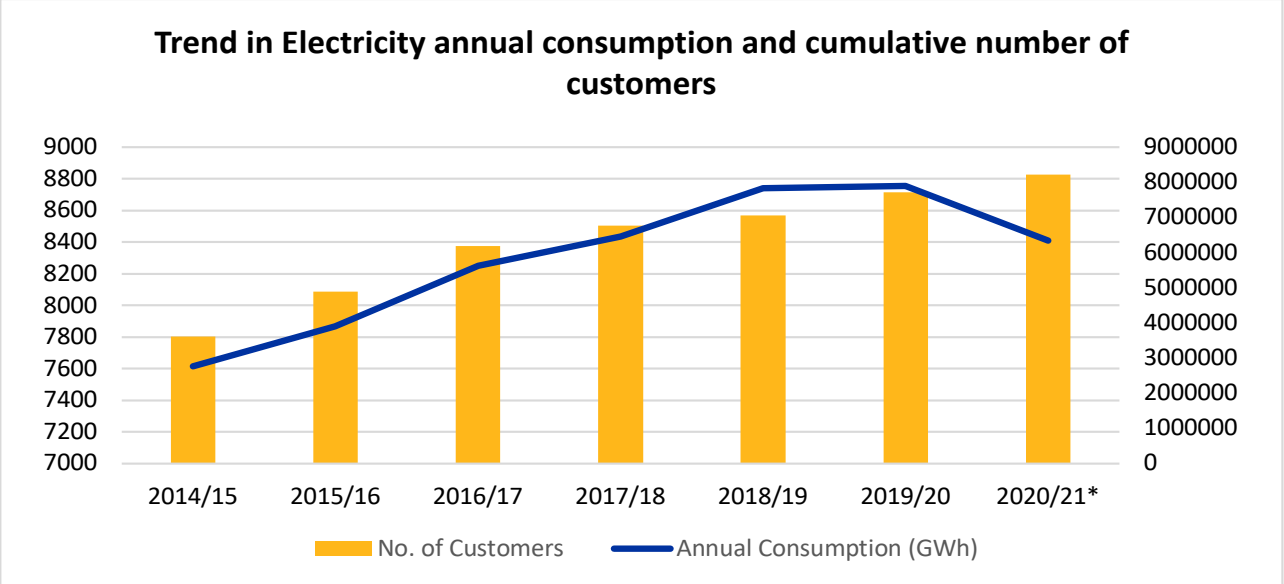
Table 3: Consumption patterns, consumer trends and customer growth 2014/15 – 2020/21

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21*
Annual Consumption (GWh)	7,615	7,867	8,250	8,435	8,742	8,755	8,408
No. of Customers	3,611,904	4,890,373	6,182,282	6,761,090	7,067,861	7,726,188	8,216,253

Source: KPLC

24. The Figure 9 below indicates the trend in annual consumption and cumulative customer numbers from 2014/15 to 2020/21.

Figure 9: Trend in Annual Consumption (GWh) and Cumulative Number of Customers



Source: KPLC

2.7.1 Analysis of Electricity Sales by Customer Category, (GWh)

25. Table 4 shows consumption of electricity by various customer categories in GWh from 2014/15 to 2020/21 for customers connected in the interconnected system (Excluding those in off grid network). During the 2020/21 financial year, the commercial industrial customer tariff category had the highest consumption at 4308GWh, representing 53% of the total consumption. This was followed by domestic customers at 2630GWh (31%), small commercial 1326 GWh (15%) and street lighting consumed 83GWh (1%).

26. Unit sales for the 2020/21 financial year recorded a 5% growth from 8,171 GWh to 8,571 GWh mainly driven by 716,206 new customer connections which contributed an additional 400 GWh, and a rebound of the economy from the effects of the Covid-19 pandemic. All customer segments recorded growth, with Commercial and Industrial growing by 4.8%, Small Commercial by 5.1%, domestic customers by 4.9% and Street-lighting by 10.2%.

Table 4: Sales in GWh Per Customer Category

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21*
Domestic	1,866	2,007	2,138	2,335	2366	2,508	2630
Small Commercial	1,143	1,153	1,201	1,222	1250	1,262	1326
Commercial and Industrial	4,030	4,104	4,266	4,225	4462	4,308	4519
Street lighting	35	40	55	66	68	76	83
TOTAL	7074	7304	6660	7,848	8146	8171	8571

Source: KPLC

Table 5: Consumption in GWh by Region

REGION	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Nairobi North	1,032	1,187	1,301	1,204	1,219	1,209
Nairobi South	1,667	1,696	1,759	1,728	1,719	1,733
Nairobi West	1,059	808	853	898	958	960
Coast	1,312	1,338	1,389	1,435	1,477	1,464
Central Rift	456	569	596	650	689	680
North Rift	269	280	269	303	288	302
South Nyanza	0	48	86	88	104	123
West Kenya	525	320	313	361	376	376
Mt Kenya	309	413	431	437	456	439
North Eastern	461	671	704	776	862	869
KPLC Sales	7,090	7,330	7,701	7,881	8,147	8,154
R.E.P. Schemes	525	537	549	554	595	602
Export Sales	40	45	22	23	27	18
TOTAL	7,655	7,912	8,272	8,459	8,769	8,773
%INCREASE P.A.	5.7%	3.4%	4.5%	2.3%	3.7%	0.0%

Source: KPLC

2.7.2 Kenya Power System Losses

27. As at May 2021, the cumulative energy purchased was 11,074 GWh, while sales stood at 8,408 GWh. This represented an overall cumulative system efficiency of 75.92%. This was below the overall cumulative efficiency recorded in the 2019/20 financial year at 76.54%.

28. The Authority reviewed the allowed loss factor from 14.9% to 19.9% effective July 2020 up until the review of the current retail tariff application by Kenya Power.

2.8 Electricity Transmission Data

29. Access and reliability of power supply are dependent on the transmission and distribution network. Over the last five years, the government has accelerated its efforts in upgrading of the networks and building new networks for effective power evacuation. The national grid network comprises of 400Kv, 220Kv and 132Kv transmission systems. The distribution network comprises of 66Kv, 33Kv and 415/240v distribution systems. The total length of the transmission and distribution network was 248,834 kilometers for all voltage levels in 2020/21 from 59,322 kilometers in 2014/15. This growth has been greatly influenced by Kenya Electricity Transmission Company (KETRACO), who have accelerated the development of transmission infrastructure within their mandate.

Table 6: Transmission and Distribution in Kilovolts (kV) 2007/8 to 2019/2020

VOLTAGE (kV)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/2020
400 kV			96.8	1,244.4	2,116.4	2,116.4
220 kV	1,352	1,452	1,555	1,686	1,686	1,686
132 kV	2,824	3,087	3,208	3,322	3,372	3,372
66 kV	952	977	1,000	1,168	1,187	1,187
33 kV	21,370	27,497	30,846	34,508	35,177	35,703
11 kV	32,823	35,383	37,234	38,968	39,797	40,616
Total HV and MV	59,322	68,396	73,940	80,897	83,335	84,681
415/240V or 433/250V		110,778	139,642	143,331	152,799	158,527
TOTAL	59,322	179,174	213,582	224,228	236,134	243,207
% INCREASE P.A.	4.8%	15.3%	19.2%	5%	5%	3%

Source: KPLC/KETRACO

30. As of June 2021, the transmission and distribution network across the country, covered a total of 248,834 kilometers as compared to 243,207Km in June 2020, an expansion of 5,627 Kms. The 400/220/132kV Olkaria - Lessos Kisumu transmission project from Olkaria II through Lessos substation to Kibos substation was commissioned in June 2021. The project will facilitate reliable and stable power to the Lake Basin Economic Block Counties as well as power trade between Kenya, Uganda, and Rwanda. The Sultan Kitui 132kV transmission line was completed in 2020 covering a total of 46 kilometers. There are plans to construct additional distribution lines and establish new substations to extend power supply in rural areas. The end goal is to attain universal access by 2022. Projects and programs are also being implemented to reduce system losses and improve system reliability.

31. Generation sub stations expansion was significant for the period under review, rising from 3,025MVA in 2015 to 3,878MVA in 2020. During the same period, transmission substation capacity expanded from 3,144MVA to 4,942MVA while distribution sub-stations increased from 3,572MVA in 2014/15 to 4,563MVA in 2019/20 FY. Distribution transformer capacity significantly increased during the same period from 6,384MVA to 8,174MVA. Table 7 shows the number of Transformers in Service, total installed capacity in MVA as of 30th June, 2020.

Table 7: Transformers in Service, Total Installed Capacity in MVA as at 30th June, 2020

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Generation Substations TOTAL	3025	3145	3205	3370	3720	3878
Transmission Substations TOTAL	3144	3704	4376	4866	4942	4942
Distribution Substations Total	3572	3848	4056	4372	4480	4563
11/0.415 kV & 33/0.415 kV Distribution Transformers	6,384	7,088	7,276	7,606	7,844	8174

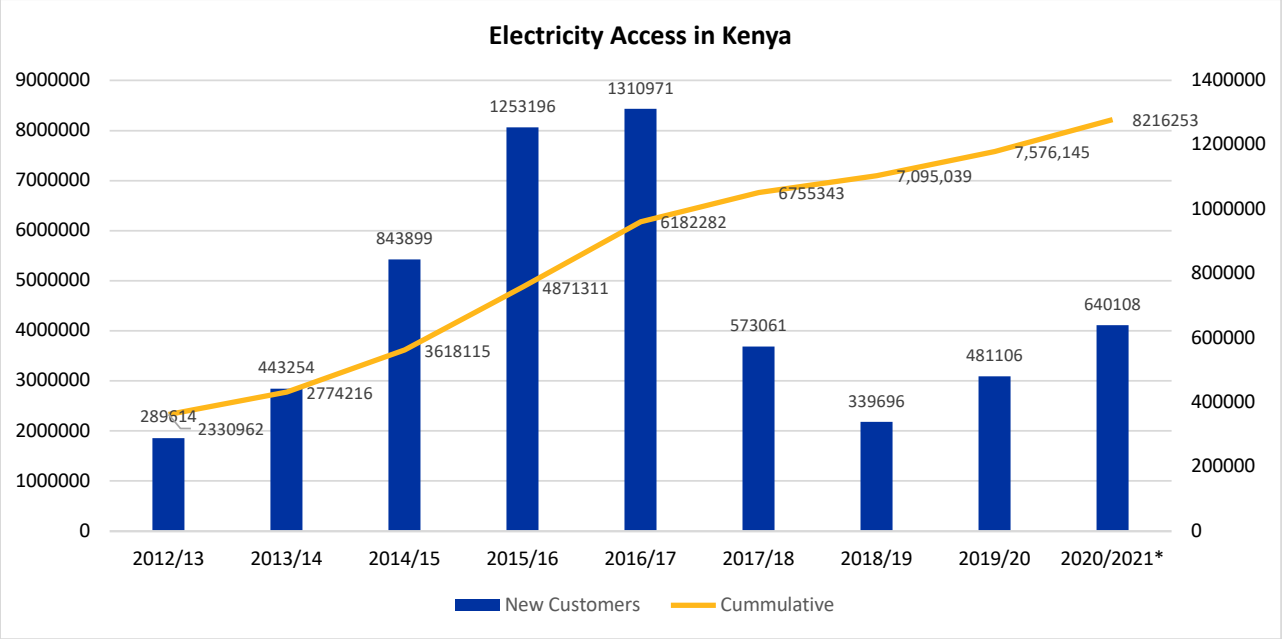
Source: KPLC

2.9 Electricity and Customer Access

32. The total number of connected customers stood at 8.2 million in May 2021. The country has passed the 75% household connectivity threshold establishing her as a regional leader in electricity access at 76.49%.

33. Between January 2020 and May 2021, 876,961 customers have been connected to the national grid up from 7,339,292 customers in January 2020 to 8,216,253 power consumers in May 2021. Kenya is currently the only East African country with electricity access to over 75% of her population. Figure 9 below shows trend analysis of electricity access in Kenya. Figure 10 below gives a trend in electricity connectivity for the period 2012/13-2020/21.

Figure 10: Trends in Electricity Connectivity, 2012/13-2020/21



Source: EPRA/KPLC

2.10 Licenses in Electrical Power Undertakings

34. The Authority is mandated by the Energy Act 2019 to issue licenses for all power undertakings in the energy sector. The Authority issues licenses to power generators, Minigrid developers, Electrical Contractors, and electrical licenses. Table 10 shows the licensed generators that were licensed during the period January 2020 to May 2021 with a total licensed capacity of 122.94MW. Table 11, table 12, table 13 and table 14 show the number of approved Minigrid generation license, solar PV licenses, approved electrical licenses and approved energy auditors.

Table 8: Approved Power Undertaking

Name of plant	Location	Licensed Capacity	Technology
Rareh Icon Solar Limited	Makueni	30MW	Solar
Marco Borero Company Ltd	Nyeri	1.5MW	Solar
Dwa Estate Limited	Makueni	1.44MW	Biomass
Rumuruti Solar Generation Limited	Laikipia	40MW	solar
Aperture Green Power Company Limited	Kiambu	50MW	Wind

Table 9: Approved Minigrid undertakings

Licensee	Technology	Location	Capacity (MW)
Kudura Power East Africa Ltd	Solar	Busia County	0.03
Kudura Power East Africa Ltd	Solar	Busia County	0.03
Kudura Power East Africa Ltd	Solar	Busia County	0.018
Kudura Power East Africa Ltd	Solar	Busia County	0.03
Kudura Power East Africa Ltd	Solar	Busia County	0.03
Kudura Power East Africa Ltd	Solar	Busia County	0.018
Kudura Power East Africa Ltd	Solar	Busia County	0.06
Kudura Power East Africa Ltd	Solar	Busia County	0.03
Renewvia Energy Kenya Limited	Solar Pv	Turkana	0.02
Renewvia Energy Kenya Limited	Solar PV	Turkana	0.06
Ses Microgrids Kenya Limited	Solar PV	Marsabit	0.02
Nal Offgrid Limited	Solar PV	Turkana	0.022

Table 10: Approved Energy Auditors and Audit Firms

Category	Number of Licenses
Energy Audit Firms	0
Energy Auditors	4

Table 11: Approved Electrical Licenses and Electrical Contractor Registration

License Class	Electrician Licenses	Electrical Contractor Registrations
C2	105	31
C1	91	43
B	14	15
A1	17	18
A2	7	0
Total	234	107

Table 12: Approved Solar PV Licenses

Category	Number of Licenses
Solar P V Contractors/Vendors (SPVC)	86
Solar PV System Manufacturers/Importers (SPVM)	0
Solar PV Technicians (SPVT)	24

3
PETROLEUM AND GAS SUB SECTOR

35. The petroleum sector is organized into three sections: the upstream, mid-stream and downstream segments. The upstream section involves the process of exploration, development and production of crude oil and natural gas. The mid-stream section revolves around storage, refining of crude oil into consumable petroleum products and transportation. In the downstream section, refined products are made available to the consumers through supply and distribution to registered petroleum retail stations.

3.1 Upstream Operations Data

36. Petroleum exploration in Kenya began in the 1950s within the Lamu Basin. It was not until 2012 when the first commercially viable oil discovery was made in the Tertiary Rift, followed by significant gas discoveries in offshore Lamu Basin. To date, over 86 wells have been drilled majority being based along the Tertiary Rift. An estimate of over 4 billion barrels of crude oil reserves have been encountered in the Lokichar sub-basin by Tullow PLC and its partners, with recovery oil estimated to be over 750 million barrels.

37. Kenya has four (4) petroleum exploration basins including: Lamu Basin, Anza Basin, Mandera Basin and Tertiary Rift Basin. Oil and gas exploration in the country began in 1956 and the breakthrough came in March 2012 with the discovery well –Ngamia 1 Well, in Lokichar Basin in Turkana County. As of December 2015, seventy-four (74) wells had been drilled with twelve (12) hydrocarbon discoveries to date, nine (9) of which are in Turkana County. The other three are in Anza Basin and Offshore Lamu.

38. Major developments in the initial stages included the creation of Central Processing Facility (CPF) to cater for 60,000-80,000 barrels of Oil per day as well as an export pipeline to Lamu. This was designed to help the company achieve an early Final Investment Decision (FID) as well as prepare for the development of all other fields at a lower unit cost post-First Oil. These fields include Etuko, Ekalese-1, Agete, Ewoi, Ekunyuk, Etom, Erut and Emekuya.

39. During the period under review, several studies to determine the process of developing the ten (10) discovered Lokichar oil fields were completed while others were ongoing. Tullow Oil and Joint Venture partners submitted a draft Field Development Plan (FDP) for phase 1 development in 2020. In addition, an exploration, and appraisal plan for phase 2 was submitted in January 2020. The draft FDP includes the development of first three fields with a production target of approximately 60,000 barrels per day and a phase 2 development of the remaining seven discovered fields reaching approximately 100,000 barrels per day.

40. The Early Oil Pilot Scheme (EOPS) project commissioned in June 2018 was closed on 2nd June 2020 after a two-year period. Discovered crude oil in South Lokichar field was found to be waxy and required a heated 820-kilometre-long crude oil pipeline to transport it from Lokichar to Lamu Port. The pipeline is expected to be eighteen (18) inches in diameter and should have one pumping station at the start of the pipeline and sixteen (16) intermediate stations spread along the route.

3.2 Mid-Stream Section

41. Mid-stream petroleum revolves around storage, refining of crude oil into consumable petroleum products and transportation of the same. Since 1963 when the Kenya Petroleum Refineries Limited was commissioned, Kenya had been importing crude oil from the Persian Gulf and refining it to products such as Motor Spirit Premium (MSP), Motor Spirit Regular (MSR), Automotive Gas Oil (AGO), Industrial Diesel Oil (IDO), Heavy Fuel Oil (HFO), Liquefied Petroleum Gas (LPG) and other special products like bitumen and grease.

42. However, with the shutting down of the refinery plant in Changamwe Mombasa County in 2013, Kenya currently imports all its petroleum products in refined form. The Ministry of Petroleum and Mining coordinates this activity with oil marketing companies through the Open Tender System (OTS). The Kenya Pipeline Company (KPC) provides product movement infrastructure including storage and oil pipeline services.

3.3 The Downstream Petroleum Sector

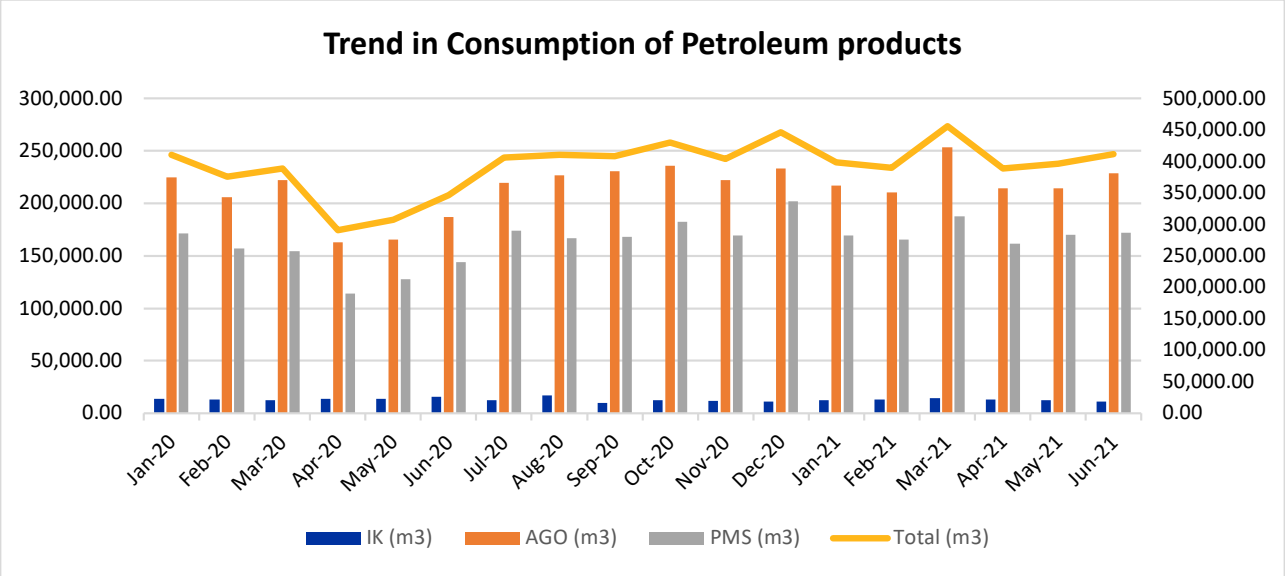
43. The downstream section revolves around distribution and marketing of the petroleum products.

3.4 Demand of Petroleum Products

44. The demand for oil across the world fell rapidly as mitigation measures instituted against the spread of the COVID-19 pandemic slowed down economic activities in 2020. The uncertainty surrounding the trajectory and intensity of the pandemic led to lack of general agreement on oil production levels between two of the largest oil producers, namely, Russia and Saudi Arabia in early March 2020. In addition, the US delay in cutting back on oil production, resulted in an oversupply of oil which led to an unprecedented collapse in oil prices. Consequently, the annual average Murban crude oil prices per barrel dropped from USD 64.92 in 2019 to USD 41.45 in 2020.

45. The demand for regulated petroleum products including Automotive Gas Oil, Dual Purpose Kerosene and Premium Motor Spirit petroleum fuels increased during the second half of 2020/21 financial year due to ease in COVID-19 restrictions. The demand for Automotive Gas Oil (AGO) reached an all-time high of 275 million litres in the February-March 2021 pricing cycles, such numbers had only been experienced in the pre-covid era where AGO demand was recorded at 219.25 million litres. The demand for Dual Purpose Kerosene continued to decline during the FY 2020/21 as total demand was recorded at 632 million litres against 967 million recorded during the FY 2019/20. This represents a decline of 34.64%. The overall demand for Petroleum Motor Spirit (PMS) and Automotive Gas Oil (AGO) increased marginally despite significant travel restrictions and lockdowns by 9.38% and 10.63% respectively.

Figure 11: Demand of Petroleum Products Jan 2020-June 2021



Source: EPRA

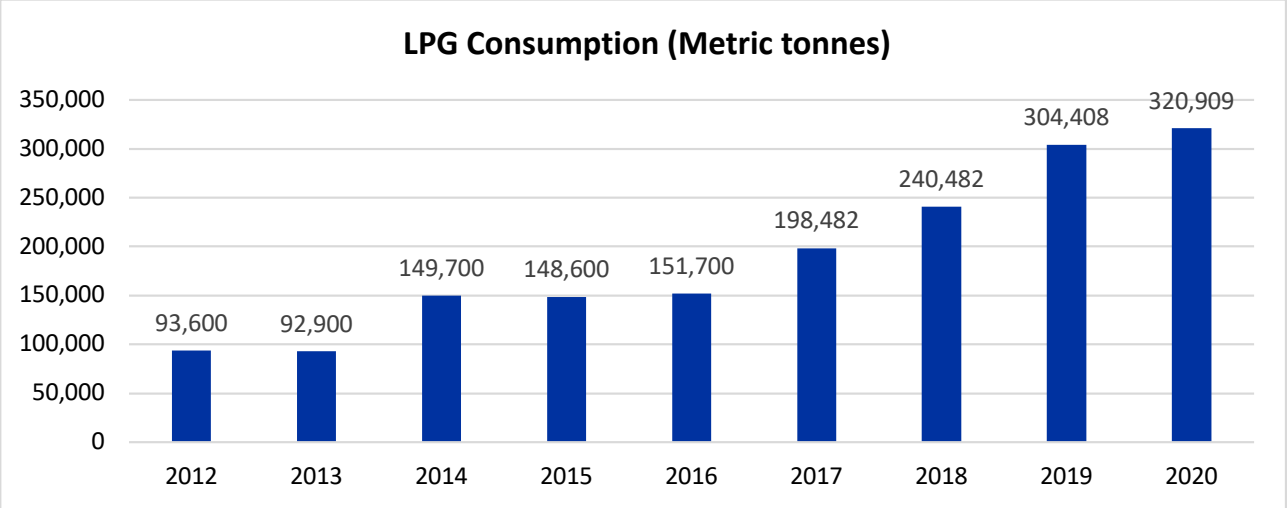
46. Total net domestic sales of petroleum fuels decreased by 9.6 per cent in 2020 to 4.7 million tonnes. This is attributed to cessation of movement measures imposed by the Government to curb the spread of COVID-19. All sectors except Government and power generation registered declines in net domestic sales of petroleum products in 2020. Fuel sales to Government increased by 37.8 per cent to 21.5 thousand tonnes in 2020. Similarly, fuel sales for power generation significantly increased from 29.1 thousand tonnes in 2019 to 75.8 thousand tonnes in 2020. Net domestic sales to the tourism sector decreased by 53.2 per cent in 2020 to 6.5 thousand tonnes while domestic sales to the aviation sector decreased by 44.8 per cent to 392.7 thousand tonnes.

47. Sales to retail pump outlets and road transport had the highest share of 78.0 per cent of the total petroleum fuels sold in 2020. This was followed by industrial, commercial, and other category; and aviation category at 10.6 per cent and 8.4 per cent of total sales, respectively.

48. LPG consumption grew rapidly from a small base in 2012, and by 2016 consumption in the residential/ commercial sector had almost doubled from 2013 levels to about 151,700 metric tons. The rapid growth

in demand continued between 2017-19, with demand nearly doubling again to 304,408 metric tons. The COVID-19 pandemic interrupted this trend in 2020 with consumption slightly increasing to 320,909 metric tonnes. The trend in consumption of LPG is summarized in Figure 12 below.

Figure 12: Trend in Consumption of LPG (Metric tonnes) 2012-2020



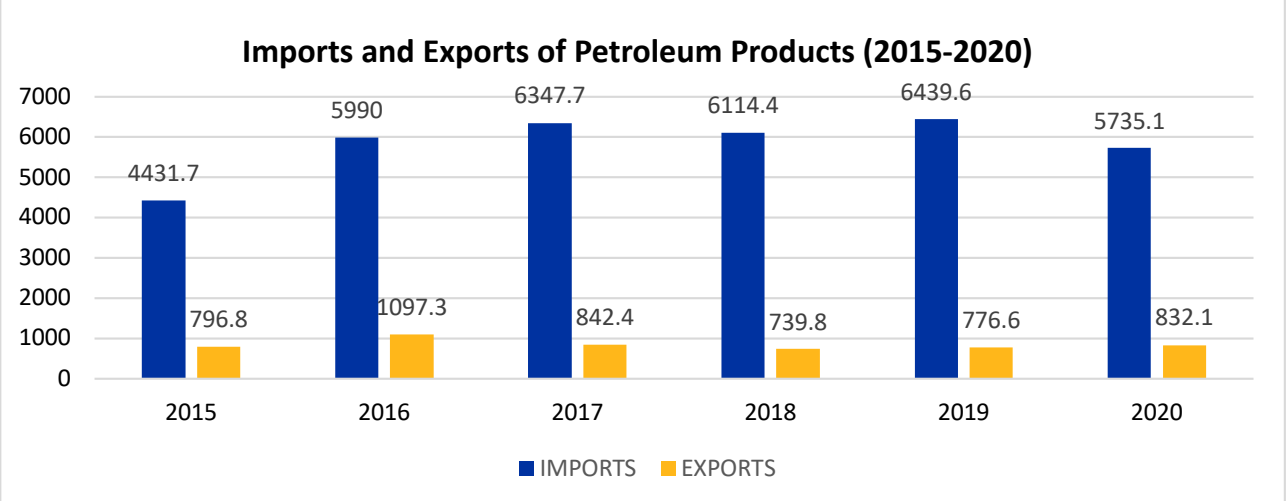
Source: EPRA

3.5 Imports of Petroleum and Gas Products

49. Petroleum is one of the prime movers of the country's social and economic development. Petroleum products are predominantly used in transport, commercial and industrial sectors. Kenya imports all its petroleum products. The Kenya Pipeline Company provides product movement infrastructure including storage and oil pipeline services.

50. The total quantity of petroleum products imported into the country decreased from 6.4396 million tonnes in 2019 to 5.7351 thousand tonnes in 2020 representing a decrease of 10.9%. The volume of total petroleum exports increased from 776.6 thousand tonnes in 2019 to 832.1 thousand tonnes in 2020. The share of re-exports to total exports dropped marginally from 97.0 per cent in 2019 to 96.6 per cent in 2020. Figure 13 shows the share of imports and exports of petroleum products in the country for the period ending 2020.

Figure 13: Quantity of Petroleum Products Imports ('000 Tonnes)



Source: EPRA

3.6 Market and Competition Data for Petroleum and Gas

51. There were over seventy-one (71) registered oil-marketing companies and 1695 registered retail stations in Kenya as of 2020. These are companies, which market, sell and distribute oil products such as diesel, kerosene, gasoline (petrol), lubricants, and liquefied petroleum gas (LPG). Importation of petroleum products through the OTS allows all the OMCs to access petroleum products at the same price and therefore ensures competition in the petroleum market. The Market has proved competitive over the last year.

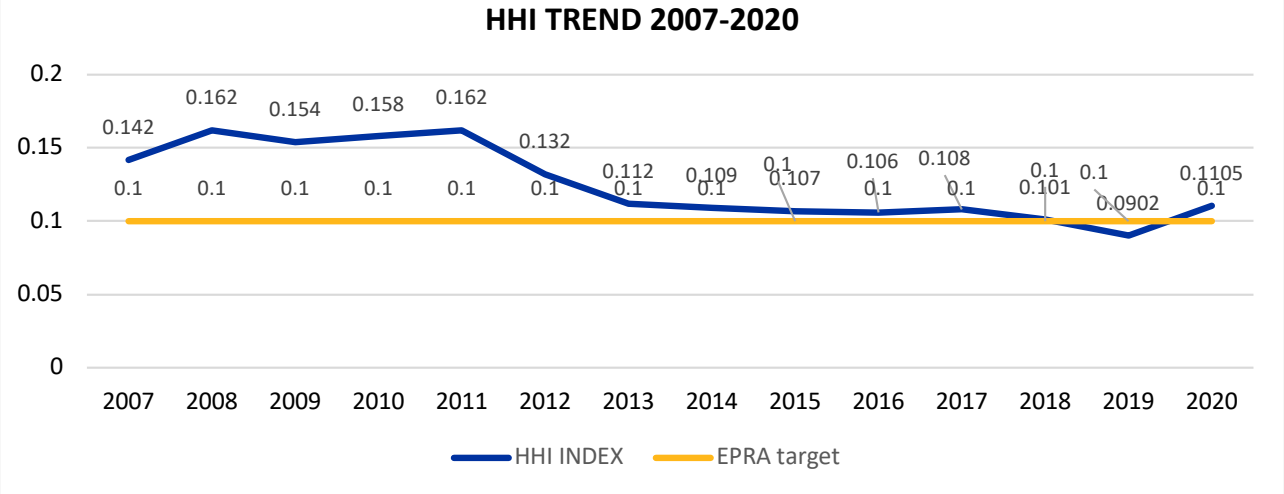
52. The Herfindahl–Hirschman Index (HHI) for the petroleum industry increased from 0.0902 in 2019 to an average of 0.1105 in 2020. The HHI fell above the Authority's expected threshold of 0.1. The high HHI index is because of four companies Vivo, Total, Rubis and Ola controlling up to 53% of the market. The market share of the different oil marketing companies for the month of December 2020 are given in the table below.

Table 13: Market share of Oil Marketing Companies (December 2020)

Oil Marketing Company	Market Share
Vivo Energy Kenya Limited	21.17%
Total Kenya Limited	18.88%
Rubis Energy PLC	7.42%
OLA ENERGY KENYA LIMITED	5.53%
GULF ENERGY HOLDINGS LIMITED	2.28%
Tosha Petroleum (Kenya) Limited	2.63%
ORYX ENERGIES KENYA LIMITED	3.29%
Hass Petroleum Kenya Limited	1.64%
Be Energy Limited	2.47%
LAKE OIL LIMITED	1.53%
Galana Oil Kenya Limited	1.58%
NATIONAL OIL CORPORATION OF KENYA	1.61%
Petro Oil Kenya Limited	2.08%
Others	27.89%

Source: EPRA

Figure 14: HHI Trend 2007-2020



Source: EPRA

3.7 Licensing of Petroleum Undertakings

3.7.1 Licensing of Petroleum and Gas

53. Section 74(1) (a) of the Petroleum Act, 2019 mandates the Authority to grant licenses, permits or certificates to any persons intending to undertake importation, exportation, bulk storage or transportation of petroleum crude or products. Below is a summary of petroleum licenses issued between January and December 2020.

Table 14: Summary of Petroleum Licenses Issued (Jan-Dec 2020)

License Category	Number issued
Bunkering of Petroleum Products (Except LPG)	10
Driver Certification	6913
Export & wholesale of Jet-A1	31
Export and Wholesale of LPG in bulk	31
Export and Wholesale of Petroleum Products (Except LPG)	1005
Import, Export and Wholesale of Bitumen	11
Import, Export and Wholesale of Fuel Oil	11
Import, Export and Wholesale of LPG in bulk	72
Import, Export and Wholesale of Petroleum Products (Except LPG)	98
Retail of LPG in Cylinders	5255
Retail of Petroleum Products (except LPG)	194
Storage & Filling of LPG in Bulk	97
Storage & Filling of LPG in Cylinders	14
Storage & Wholesale of LPG in cylinders	51
Storage of petroleum products (Except LPG)	2
Transport of Jet-A1	6
Transport of LPG in bulk	18
Transport of LPG in Cylinders	113
Transport of petroleum products (Except LPG)	146

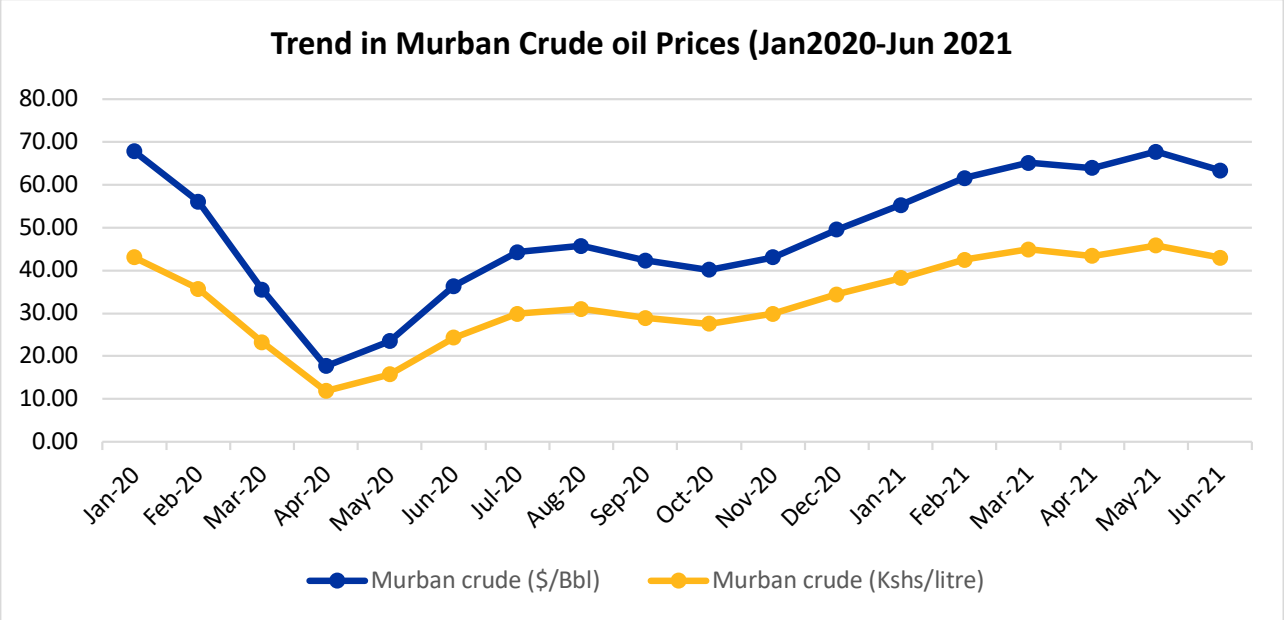
Source: EPRA

3.7.2 International Oil Prices

54. Regarding the international oil and gas markets, the OPEC Basket is one of the most crucial benchmarks for crude oil prices worldwide. The other most significant benchmarks are UK Brent, West Texas Intermediate (WTI), and Dubai Crude (Fateh).

55. The international oil prices declined from USD67.8 per barrel in January 2020 to an all-time low of USD17.64 per barrel in April 2020. This was followed by an increase reaching USD45.74 per barrel in August 2020. The Murban Crude then steadily fluctuated closing the year at USD49.57 per barrel.

Figure 15: Trend in Murban Crude Oil Prices Jan 2020-June 2021



Source: EPRA

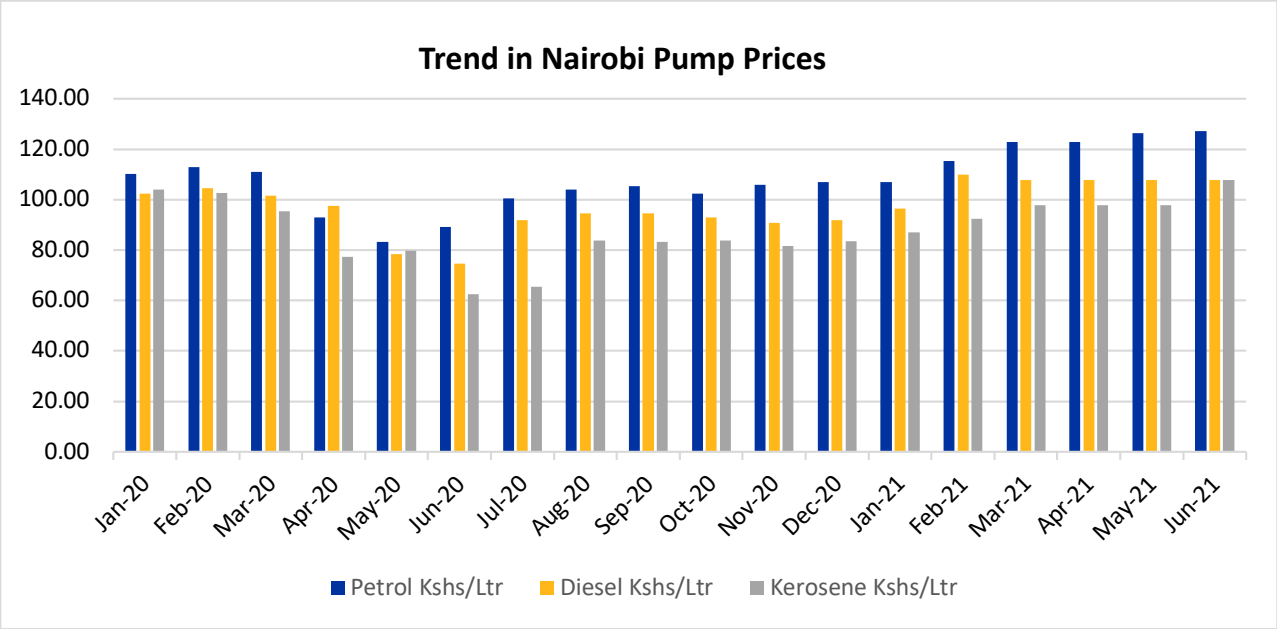
56. The global impact of the COVID-19 pandemic on the global oil sector accelerated the volatility of prices and demand. The lowest price during the fourth quarter for Murban Crude was USD17.64 per barrel in April 2020. This significantly reduced landed costs of Premium Motor Spirit (PMS) and Automotive Gas Oil (AGO) in April 2020 by almost a half of the previous month. Additionally, the pandemic created an adverse shock to some of the key macroeconomic factors such as foreign exchange rate, which continued to depreciate in the fourth quarter. These adverse effects have continued to have a ripple effect on electricity and petroleum pump prices and other complementary services.

3.7.3 Pricing Data for Petroleum and Gas

57. Under, Section 101(y) of the Petroleum Act 2019, EPRA, is mandated to determine the wholesale and retail prices of petroleum and petroleum products. In compliance with the statute, the Authority regulates the maximum petroleum pump prices for AGO, Super Petrol and Illuminating Kerosene. The Authority publishes maximum pump prices for all major towns around the country every 14th day of the month.

58. The analysis of petroleum pump prices displayed mixed performance in the last one year. For Nairobi, Super petrol pump prices increased from 110.20Ksh/litre in January to 112.87Ksh/ litre in February 2020. This was followed by a decline to 83.33Ksh/litre in May 2020. This was as a result decline in international oil prices reaching an all-time low in April 2020. Petroleum prices then gradually increased to 106.82 Ksh/litre in December 2020. This was followed by a continuous increase to cap at 126.37Ksh/Litre in May 2021. Diesel pump prices decreased from 104.45 Ksh/litre in February to an all-time low 74.54 Ksh/litre in June 2020. Diesel prices then increased 94.63Ksh/Litre in August 2020 then declined to 91.82Ksh/Litre in December 2020 followed by a continuous increase to 107.66 Ksh/Litre in May 2021. Kerosene pump prices steadily declined from 102.69Kshs/litre in February 2020 to a minimum of 62.46 Ksh/litre in June 2020 then experienced steady fluctuations and closing the year at 83.56 Ksh/litre in December 2020. The year 2021 was characterized by a continuous rise in Kerosene prices reaching 107.66Ksh/Litre in May 2021. This is summarized in the figure below.

Figure 16: Trend in Nairobi Pump Prices Jan-2020 to May 2021



Source: EPRA

59. LPG prices are not regulated. This is mainly because the LPG infrastructure is still underdeveloped. However, with improvement of infrastructure, the Open Tender System (OTS) can be introduced to deepen competition and economies of scale in supply.

4
RENEWABLE ENERGY

60. Kenya has promising potential for power generation from renewable energy sources. Following a least-cost approach, the government has prioritized the development of geothermal and wind energy plants as well as solar-fed mini-grids for rural electrification.

4.1 Solar Energy

61. Kenya's geographical location astride the equator gives it a unique opportunity for a vibrant solar energy market. The country receives good solar insolation all year round coupled with moderate to high temperatures estimated at 4-6 kWh/m²/day. The percentage of solar energy harnessed for commercial and domestic applications is insignificant relative to the potential. Solar energy can be used for lighting, heating, drying, and generating electricity.

4.1.1 Installed Capacity of Solar Power

62. The Garissa Solar Power Plant owned by the Rural and Renewable Energy Corporation (REREC), with an installed capacity of 54.5MW, Selenkei and Cedate solar with an installed capacity of 40MW each are the only solar power plants connected to the national grid. The grid covers only a small percentage of the national territory. Connectivity in rural areas is low. Solar home systems provide an alternative to allow rural dwellers to access electricity without connecting to the grid.

4.1.2 Solar Home Systems

63. The use of solar home systems in Kenya has increased over the years as the government ramps up initiatives to increase universal access to electricity by 2022. The development of the Kenya Off-grid Solar Access project (KOSAP), financed by World Bank to the tune of $150 million to undertake provision of electricity and clean cooking facilities to the fourteen marginalized counties in Kenya is a clear indicator of the government's commitment.

64. KOSAP targets to provide 250,000 stand-alone solar systems and 150,000 clean cooking stoves to households in the targeted areas during the 2018-2023 period. Regionally, Kenya is at the forefront of consumption and use of solar off-grid products, which include portable lanterns, multi-light systems and Solar Home Systems.

65. The high level of use has been through the sale of products which best fit the purchasing power of rural households and making such products easily accessible to potential consumers. Companies such as M-Kopa, Sun King, Mobisol and Azuri offer customers a battery package that can run three or four lights, television, and a sound system. Payment modes differ with most customers paying monthly by use of mobile platforms for three years prior to taking full ownership of the product.

4.2 Bioenergy

66. Bioenergy is energy derived from various sources of solids, liquids and gaseous biomass including fuel wood, charcoal, ethanol, bio-diesel and biogas. Biomass contribution to Kenya's final energy demand is 70% and provides for more than 90% of rural household energy needs. The main sources of biomass in Kenya include charcoal, wood-fuel, and agricultural waste. The government has identified the existence of a substantial potential for power generation using forestry and agro-industry residues including bagasse. The Bio joule Biogas power plant with an installed capacity of 2MW is the only biogas plant connected to the national grid. However, opportunities within sugar factories estimated to be up to 300MW have not been exploited.

4.2.1 Biogas Installations in Kenya

67. Biogas in Kenya is widely produced with over 8000 biogas plants utilizing various raw materials e.g., agricultural, slaughterhouse, and municipal wastes etc. However, the situation is amorphous as there is no consolidated data on biogas production making it a challenge in determining the country's installed capacity.

68. According to The Kenya Biogas Program (KBP) a lead entity in implementing the Africa Biogas Partnerships Program (in Kenya), Kenya has a potential of 3,000,000 biogas plants. Over 21,000 Bio-digesters have been installed across the country to date.

4.3 Wind

69. Kenya has an excellent wind energy potential. The Best wind sites in Kenya are in Marsabit, Samburu, Laikipia, Meru, Nyeri, Nyandarua and Kajiado counties. Other areas of interest are Lamu, offshore Malindi, Loitokitok at the foot of Kilimanjaro and Narok plateau. On average, the country has an area of close to 90,000 square kilometers with excellent wind speeds of 6m/s and above.

70. Wind energy is used for practical purposes such as electricity generation, charging batteries, or pumping water. Large, modern wind turbines operate together in wind farms to produce electricity for utilities. By May 2021, the installed capacity of wind plants was 435.5MW.

71. The grid connected wind turbines in Kenya are: KenGen 25.5MW wind plant in Ngong comprising of thirty (30) 850kW turbines, Lake Turkana wind power (310MW), and the 100MW Kipeto wind power plant.

4.4 Geothermal Energy

72. Geothermal energy utilizes the heat coming from the earth's sub-surface. Deep wells are dug to access steam and hot water from underground reservoirs. Steam is then used to drive turbines connected to electricity generators.

73. Geothermal energy is dominant in the Rift Valley region with recent estimates putting the resource potential at about 10,000MW. The installed capacity by June 2021 was 863.128MW. Of this installed capacity KENGEN contributes 82.6% (713.128MW) while the remaining 150MW from the Independent Power Producers. Currently, geothermal capacity provides nearly 50% of total power generation. Due to the low short-run marginal costs, geo-thermal power plants generally run as base load. At present, geothermal power is being harnessed in the Olkaria, Menengai and Eburru fields.

5
OTHER ENERGY SOURCES AND CROSS CUTTING ISSUES

5.1 Coal Generated Energy

74. Coal is a combustible black or brownish-black sedimentary rock, formed as rock strata called coal seams. Coal is mostly carbon with variable amounts of other elements; chiefly hydrogen, sulfur, oxygen, and nitrogen. Coal is formed if dead plant matter decays into peat and over millions of years the heat and pressure of deep burial converts the peat into coal.

5.1.1 Coal Exploration

75. The Ministry of Energy has been conducting coal exploration in the Mui Basin since 1999, covering an area of 500 square kilometers and already two promising blocks have been concessioned to a Chinese company. To ease exploration logistics, the ministry subdivided the Mui Basin into four coal blocks, A, B, C and D, measuring 121.5, 117.5, 131.5 and 120 kilometer squared, respectively. Seventy-one exploration and appraisal wells have been drilled in the Mui Basin, mainly concentrated in Block C where 56 wells were drilled to depths ranging from 75 to 445 metres. Some 32 wells have intersected coal.

76. To fast-track exploration, development and production, the Government has concessioned all four blocks to private companies through a competitive international bidding process.

5.2 Nuclear energy

77. Kenya has embarked on a programme to see the country generate 1 GW (1,000 MW) from Nuclear sources between 2020 and 2027. By 2030 Kenya, the Country approximated to have installed a capacity of 4GW of nuclear energy, generating about 19% of Kenya's energy needs. Nuclear power is therefore poised to become the second largest source of energy in Kenya after geothermal power, a clean form of energy. This will be spear-headed by the Nuclear Power Energy Agency (NuPEA) formally the Kenya Nuclear Electricity Board.

6
ENERGY MATRIX FOR KENYA

78. EPRA has developed Energy balances for Kenya which show the flow of energy from production, through transformation to final consumption in one common unit of measurement i.e., thousand tonnes of oil equivalent (ktoe). Energy balances are considered as the best way of presenting energy flows in each economy. Various multi-lateral agencies including Eurostat, the International Energy Agency (IEA) and the United Nations (UN) also construct Energy Balances.

79. An Energy Balance is an accounting framework for the compilation and reconciliation of data on all energy entering, exiting, and used within the national territory of a given country during a reference period. The Energy Balance expresses all forms of energy in a common accounting unit and shows the relationship between the inputs to and the outputs from the energy transformation industries.

80. In the Energy Balance, all energy flows should be accounted for, and the balance is based on the first law of thermodynamics, which states that: "the amount of energy within any closed system is fixed and can neither be increased nor diminished unless energy is brought into or sent out from that system".

81. Energy balances show the commodity balances in a way that explains fuel conversion and the dependence of supply of one fuel on one another. It presents the energy flow as the primary fuels are processed or used and as the consequent secondary fuels are produced and used.

82. The presentation of energy statistics expressed in natural units in the form of commodity balances between the supply and use of the energy commodities provides a check on the completeness of the data and a simple means of assembling the main statistics of each commodity so that key data are easily obtained. However, because fuels are mainly bought for their heat-raising properties and can be converted into different fuel products, it is also helpful to present the supply and use data in energy units. The format adopted is termed as the energy balance and allows users to see the fuel conversion efficiencies and the relative importance of the different fuel supplies in their contribution to the economy. The energy balance is also the natural starting point for the construction of various indicators of energy consumption (for example consumption per capita or per unit of GDP) and of energy efficiency. The energy balance also acts as a high-level check on the data accuracy as apparent energy gains in conversion processes or large losses indicate data problems.

83. The energy balance is a multipurpose tool. The main purposes of its compilation include:

a) To enhance the relevance of energy statistics by providing comprehensive and reconciled information on the energy situation on national territory.

b) To provide comprehensive information on energy supply and demand in national territories to understand energy security, the effective functioning of energy markets and other relevant policy goals and to formulate energy policies.

c) To serve as a quality tool to ensure the consistency and comparability of basic statistics.

d) To ensure comparability between different years and between different countries.

e) To establish the basis for estimation of CO2 emissions.

f) To provide the basis for aggregated indicators (e.g., energy intensity etc);

g) To compute efficiencies of all the transformation processes occurring in the country (e.g., refining, electricity production by combustion of fuels, etc.);

h) To allow calculation of relative shares of various products (including renewables vs non-renewables) or sectors to the country total.

i) To provide an input for forecast modelling and

ii) To provide a common framework for international comparisons.

84. The scope of an energy balance is determined, amongst other things, by the territory, product and flow boundaries:

i) Territory boundary – defined by the boundary of the national territory of the compiling country.
ii) Product boundary – defined by the scope of all energy products shown in the balance columns.
iii) Flow boundary – defined by the scope of energy flows (uses) shown in the balance rows.

85. Product and flow boundaries are fixed in the short term. If new sources of energy are discovered and used, they should be reflected in the balance. The scope of energy balance does not include:

i) Passive energy such as heat gain of building and solar energy falling on the land to grow crops, etc.
ii) Energy resources and reserves.
iii) Extraction of any materials not included in primary energy production.
iv) Non-energy products not used for energy purposes (e.g., waste and wood are covered in energy balance only to the extent they are used for energy production and not when used for other purposes).

86. The energy balance shows the content of the commodity balances translated into a standard energy unit. In Kenya, tonnes of oil equivalent (toe) are used, though alternatives such as joules, therms or GWh could be used. The balance shows, for all fuels together the flows from production to final use, including the movements between fuel categories, for example gas produced, may be transformed into electricity, and then consumed by the domestic sector.

6.1 Structure of the Energy Balance for Kenya

87. The energy balance presents an overall view of the energy supplies for Kenya; the relative importance of each energy commodity; dependence on imports; the contribution of our own fossil and renewable resources and the interdependence of commodities on one another.

88. Primary energy supply: Within the energy balance, production covers extraction of primary fuels and the generation of primary electricity (hydro, nuclear, wind). The production of secondary fuels (refined petroleum products such as petrol) and secondary electricity (that generated from coal-fired power stations) are shown in the transformation section and not in the indigenous production row at the top of the balance. For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of primary electricity comprises hydroelectricity, wind and nuclear energy. The energy value for hydroelectricity is taken to be the energy content of the electricity produced from the hydro power plant and not the energy available in the water driving the turbines. A similar approach is adopted for electricity from wind generators where the electricity is regarded as the primary energy form because there are currently no other uses of the energy resource “upstream” of the generation. For nuclear, an estimate of the heat content of the steam from the reactor is used as a measure of production output.

89. The other elements of the supply part of the balance are identical to those in the commodity balances, imports, exports, marine bunkers, and stock change. Exports and international marine bunkers are normally shown with negative signs, to indicate that they are taken away from the production figure before determining a measure of primary supply.

90. A stock build carries a negative sign to denote withdrawal from supply whilst a stock draw carrying a positive sign shows addition to supply. Primary supply expresses the national requirement for primary energy commodities from all sources and foreign supplies of secondary commodities. It is an indicator of the use of indigenous resources and external energy supplies. Both the amount and mixture of fuels in final consumption of energy commodities in the United Kingdom will differ from the primary supply. The “mix” of commodities in final consumption will be much more dependent on the manufacture of secondary commodities, in particular electricity. Primary supply is the combination of the indigenous production, trade, marine bunkers, and stock changes (taking their signs into account).

91. Transformation: This plays a key role in moving primary electricity from its own column in the balance into the electricity column, so that it can be combined with electricity from fossil fueled power stations and the total disposals shown.

92. Indigenous production of primary electricity comprises of nuclear electricity, hydroelectricity, and electricity from wind generation. Nuclear electricity is obtained by passing steam from nuclear reactors through conventional steam turbine sets. The electrical energy from hydro and wind is transferred from the Primary electricity column to the Electricity column using the transfers row because electricity is the form of primary energy, and no transformation takes place.

93. Quantities of fuels entering the transformation activities (fuels into electricity generation and heat generation, crude oil into petroleum products (refineries), or coal into coke ovens) are shown with a negative sign to represent the input and the resulting production is shown as a positive number. For electricity generated by major power producers, the inputs are shown in the major power producers' row of the coal & peat, crude oils, petroleum products, gas, geothermal, solar & wind etc., combustible, renewable and waste, primary electricity, and heat columns. The total energy input to electricity generation is the sum of the values in these ten columns. The Total column shows total electricity generated from these inputs. Within the transformation section, the negative figures in the Total column represent the losses in the various transformation activities. This is a convenient consequence of the sign convention chosen for the inputs and outputs from transformation. Any positive figures represent a transformation gain and, as such, are an indication of incorrect data.

94. Energy industry use and final consumption in which the figures for final consumption and energy industry use follow, in general, the principles and definitions described under Concepts and Definitions.
Kenyan Energy Matrix

95. Kenya is still a modest consumer of energy going by the 2020 figures. The total electricity generation slightly decreased from 11,620.7 GWh in 2019 to 11611.34GWh in the year 2020. Geothermal remained major source of generated electricity in the country recording up to 48.4% of total generated electricity. Wind power registered substantial decline from1,562.7 GWh in 2019 to 1331.36GWh in 2020. Solar generation declined from 92.3GWh in 2019 to 88.42GWh in 2020. Hydro power registered an increment of 33% from 3205.34GWh in 2019 to 4240.42GWh in 2020. Thermal generation declined by 42.6% from 1313.28GWh in 2019 to 754.42GWh in 2020. However, the country is currently benefiting from renewable energy sources with over 85% of electricity generation from renewable sources. Additionally, 89.8% of electricity consumed was generated within the country.

96. The total electricity generated, is shared by more than 75% of the country population leaving less than 25% without access to the electricity. This means that some are using either charcoal or firewood as their source of energy especially in the rural areas.

97. The quantity of petroleum products imported decreased by 10.9 per cent to 5.7 million tonnes in 2020. The volume of total petroleum exports increased from 776.6 thousand tonnes in 2019 to 832.1 thousand tonnes in 2020. The share of re-exports to total exports dropped marginally from 97.0 per cent in 2019 to 96.6 per cent in 2020. The decrease in imports was mainly due to a reduction in mobility brought about by containment measures to curb the spread of COVID-19 coupled with the sharp fall in global oil prices in 2020.

6.2 Summary of the overall Energy Balances for Kenya

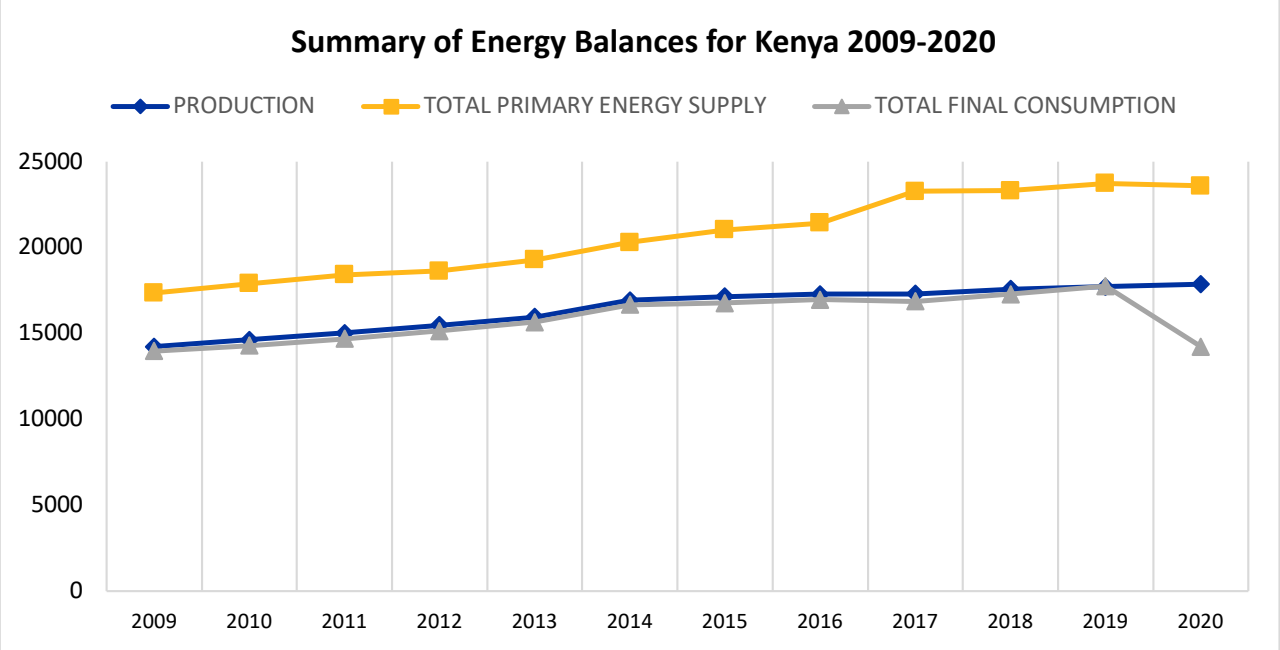
98. The overall energy balance for Kenya indicates that the total indigenous production, primary energy supply and total final energy consumption have generally been increasing except for the year 2020 which recorded a decline. This has been driven by population growth and expansion of the economy. The total production increased from 17,713.69 tonnes in 2019 to 17, 867.31 tonnes in the year 2020. Regarding the total energy supply, it decreased from 23,730.85 tonnes in 2019 to 23,583.13 tonnes in 2020. Total final consumption decreased from 17,756.99 tonnes in 2019 to 14237.25 tonnes in 2020. This was because of contraction of the economy due to the impact of covid 19 pandemic. Table 15 and Figure17 respectively provide a summary of the energy balances for Kenya from 2009 to 2020.

Table 15: Summary of Energy Balances for Kenya 2009-2020

YEAR	PRODUCTION	TOTAL PRIMARY ENERGY SUPPLY	TOTAL FINAL CONSUMPTION
2009	14236.2	17357.132	13970.702
2010	14634.2	17909.451	14293.151
2011	15016.7	18423.669	14690.169
2012	15484.6	18640.235	15135.955
2013	15953.4	19279.148	15658.748
2014	16919.56	20290.31509	16671.17385
2015	17151.43	21028.67064	16762.46134
2016	17284.79	21428.95727	16972.3438
2017	17305.84405	23277.21925	16867.92614
2018	17575.26041	23318.63176	17281.43344
2019	17713.69027	23730.84564	17756.9911
2020	17867.30592	23583.12983	14237.25065

Source: KNBS, EPRA calculations

Figure 17: Summary of Energy Balances for Kenya 2009-2020



Source: KNBS, EPRA calculations

7
ELECTRICITY REGULATORY INDEX FOR AFRICA

99. The Electricity Regulatory Index (ERI) is a composite index that measures the level of development of electricity sector regulatory frameworks in African countries against the international standards and best practices. It is based on three pillars: Regulatory Governance Index (RGI), Regulatory Substance Index (RSI) and Regulatory Outcome Index (ROI).

7.1 Regulatory Governance Index (RGI)

100. Regulatory Governance Index RGI assesses the extent to which the laws, procedures, standards, and policies governing the electricity sector provide for a transparent, predictable and credible frameworks that meets the international standards. The RGI thus assesses the institutional and legal design of the regulatory framework within which regulatory decisions are made.

7.2 Regulatory Substance Index (RSI)

101. Regulatory Substance Index (RSI) evaluates how the electricity sector regulators are carrying out their mandate and implementing the practices and processes that affect regulatory outcomes. It assesses the content of regulations and actual decisions implemented by regulators.

7.3 Regulatory Outcome Index (ROI)

102. Regulatory Outcome Index (ROI) measures, from the perspective of utility companies and consumers the degree to which the regulator has an impact on the sector. The ROI assesses how regulatory actions and decisions can achieve the expected results on the sector. The ROI is calculated from an aggregation of survey responses from the electricity distribution utilities and power consumers.

Electricity Regulatory Index for Africa 2020.

Score range	Interpretation
0.800 to 1.000	**High level of regulatory development** Most of the elements of strong policies, regulatory, legal, and institutional framework are in place
0.600 to 0.799	**Substantial level of regulatory development** Most elements of supportive regulatory framework are established although with weakness that does not permit the regulator to have strong capacity, legal and institutional structures
0.500 to o.599	**Medium Level of Regulatory Development** Basic elements of supportive regulatory framework are established with limited legal and institutional structures and capacity of the regulator
0.000 to 0.499	**Low Level of Regulatory Development** Few or no elements of supportive regulatory framework. Insufficient or non-existent legal and institutional structures and capacity of the regulator

104. Electricity Regulatory Index for Africa 2020 rank Kenya among the top performing countries. Uganda (0.801), Namibia (0.759), Tanzania (0.721), Zambia (0.655) and Kenya (0.633) were the top five performers of the 36 countries which participated in the survey. From the survey Kenya was rated to have high level of regulatory development with regard to Regulatory Governance Index (0.828) and Regulatory Substance Index (0.888). However, Kenya was rated to have low levels of regulatory development regarding the Regulatory Outcome Index (0.468). The table below shows the country scores and ranking of the ERI 2020.

7.4 Electricity Regulatory Index for Africa 2020

Table 16: Kenya ERI Scores 2018-2020

Kenya	RGI	RSI	ERIGS	ROI	ERI	RANK
2018	0.826	0.645	0.736	0.703	0.719	5/15
2019	0.926	0.918	0.922	0.577	0.727	3/32
2020	0.828	0.888	0.858	00.468	0.633	5/36

Source: ERI 2018, 2019, 2020

Table 17: ERI ranking 2020

Country	RGI	RSI	ROI	ERI	Rank
Uganda	0.925	0.945	0.686	0.801	1
Namibia	0.817	0.782	0.721	0.759	2
Tanzania	0.904	0.926	0.568	0.721	3
Zambia	0.690	0.687	0.622	0.655	4
Kenya	0.828	0.888	0.468	0.633	5
Zimbabwe	0.698	0.723	0.561	0.631	6
Niger	0.724	0.581	0.571	0.611	7
Nigeria	0.900	0.790	0.417	0.594	8
Angola	0.749	0.674	0.494	0.593	9
Ethiopia	0.657	0.674	0.519	0.587	10

Source: ERI 2020

8
CONCLUSION

Kenya's energy sector has a stable and expanding supply with healthy surplus of installed capacity relative to the country's peak demand. The country has successfully adopted more renewable energy than many in the region, with less than 20% of its electricity mix derived from fossil fuels. This is in line with the Government priority in the use of green energy sources to promote environmental sustainability as well as adapt to and mitigate against the effects of climate change.

Private sector undertaking in the generation of electricity, IPPs covering about 40% of the generation has improved competition in the energy sector. With continuous private sector involvement, KenGen dominance in generation is likely to face stiff competition in future.

Competition in the petroleum sector is healthy attributed to the open tender system of sourcing petroleum products. However continued merger of the big oil marketing companies is likely to be disruptive.

ANNEXES

Annex 1 Requirements for issuance of Petroleum Licenses (Except LPG)

1. Oil Marketing Companies intending to trade in Jet A1 or other aviation petroleum fuels

a) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million
b) Proof of ownership of into plane refueling dispenser or evidence of lease of the equipment from a licensed supplier of Jet A1 at the airport or airstrip of operation.
c) Proof of office space at the airport or airstrip of operation.
d) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
e) Certificate of Incorporation/Business registration certificate Valid tax compliance certificate from Kenya Revenue Authority
f) Single Business Permit for the office premises from the County Government Work permits Class "G" for foreign directors as per the CR12
g) Proof of application for membership to a National Oil Spill Contingency Group

2. Import, Export and Wholesale of Bitumen - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of Incorporation/Business registration certificate
d) Valid tax compliance certificate from Kenya Revenue Authority
e) Single Business Permit for the office premises from the County Government
f) Work permits Class "G" for foreign directors as per the CR12

3. Import, Export and Wholesale of Bitumen - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of Incorporation/Business registration certificate
d) Valid tax compliance certificate from Kenya Revenue Authority
e) Single Business Permit for the office premises from the County Government
f) Work permits Class "G" for foreign directors as per the CR12

4. Bunkering of Petroleum Products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
b) Certificate of Incorporation/Business registration certificate
c) Valid tax compliance certificate from Kenya
d) Revenue Authority Work permits Class "G" for foreign directors as per the CR12
e) Single Business Permit for the office premises from the County Government
f) Proof of application for membership to a National Oil Spill Contingency Group

5. Export and Wholesale of Petroleum Products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
b) Certificate of Incorporation/Business registration certificate Valid tax compliance certificate from Kenya Revenue Authority
c) Single Business Permit for the office premises from the County Government Work permits Class "G" for foreign directors as per the CR12

6. Export and Wholesale of Jet A1 - New Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies Valid Tax Compliance Certificate from Kenya Revenue Authority
b) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
c) Single Business Permit to operate business from the respective County Government Work Permits Class "G" for foreign directors as per CR12
d) Proof of ownership of into plane refueling dispenser or evidence of long-term lease of the equipment (minimum 5 years) from a licensed supplier of Jet A1 at the airport or airstrip of operation.
e) Valid license for Import, Export and Wholesale of Petroleum Products (Except LPG) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million

7. Storage of petroleum products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
b) Certificate of Incorporation/Business registration certificate Valid tax compliance certificate from Kenya Revenue Authority
c) Single Business Permit for the office premises from the County Government Work permits Class "G" for foreign directors as per the CR12 Environmental Impact Assessment license from NEMA
d) Confirmation from KEBS that the facility complies with the Kenya Standard (Inspection Report)
e) Fire clearance certificate from the respective County Government Certificate of registration of workplace from DOSHS
f) Valid certificate of Calibration of the petroleum tanks

8. Transport of petroleum products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
b) Certificate of incorporation/business registration certificate
c) Work permits Class "G" for foreign directors as per the CR12 Valid tax compliance certificate from KRA;
d) Single Business Permit for the office premises from the County Government A valid certificate of calibration for the tanker mounted on each vehicle
e) Fire certificate for the vehicle from the County Government
f) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
g) Log books for each prime mover and trailer (Attach lease agreement if not in the name of owner/ company)
h) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

9. Transport of by rail (Except LPG) - New Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Certificate of Incorporation / Business Registration Certificate
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
e) Single Business Permit to operate business from the respective County Government
f) Work Permits Class "G" for foreign directors as per CR12
g) Scanned original copy of valid mechanical inspection certificate for each wagon
h) Scanned original copy of valid certificate of calibration for each Petroleum Wagon
i) Scanned original copy of fire certificate for each wagon from the County Government
j) Scanned original copy of proof of ownership of each petroleum wagon or lease agreement with owner of the wagons
k) List of locomotive drivers and their certifications
l) Scanned original copy of valid Medical Surveillance certificate for each locomotive driver from DOSHS approved doctors

10. Retail of petroleum products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA;
f) Single Business Permit for the office premises from the County Government
g) Proof of ownership of the petrol Service Station (Ownership documents of the petrol service station OR Long term lease (Minimum 5 years)
h) Environmental Impact Assessment License (EIA) or Environmental Audit acknowledgement letter from NEMA
i) Certificate of compliance with the Physical Planning Act of 1999
j) Fire certificate from the Chief Fire Officer Respective County Government;
k) A valid copy of certificate of registration of work place from DOSHS
l) A valid copy Fuel dispensing Meter calibration certificate(s) from Weights and Measures Department
m) A valid certificate of calibration for the Underground Storage tank(s)
n) A scanned copy of Pressure test Report for the Storage tank(s)(not older than 60 months

11. Retail of petroleum products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA;
e) Single Business Permit for the office premises from the County Government
f) Environmental Impact Assessment licence (EIA) or Environmental Audit acknowledgement letter from NEMA
g) Fire certificate from the Chief Fire Officer Respective County Government;
h) A valid copy of certificate of registration of work place from DOSHS
i) A valid copy Fuel dispensing Meter calibration certificate(s) from Weights and Measures Department
j) A valid certificate of calibration for the Underground Storage tank(s)
k) A scanned copy of Pressure Test Report for the Storage tank(s) (not older than 60 months

12. Import, Export and Wholesale of Petroleum Products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Single Business Permit for the office premises from the County Government Work permits Class "G" for foreign directors as per the CR12
d) Proof of valid membership to a National Oil Spill Contingency Group
e) Proof of fulfilment of line fill obligations from Kenya Pipeline Company Limited Clearance letter from Kenya Maritime Authority (KMA) on Compliance with International Oil Pollution Compensation Fund
f) Proof of online submission of annual purchases and sales data
g) Proof of operations in Kenya with sales volume of a total 6.6 Million litres of either/or
h) Combination of PMS, AGO or IK within 1 year or ownership of 5 licensed retail outlets that meet the Kenya Standard or Proof of ownership of one (1) licensed petroleum depot.

13. Import, Export and Wholesale of Fuel Oil - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Single Business Permit for the office premises from the County Government Legible copies of Identification documents for directors (IDs/passports) Work permits Class "G" for foreign directors as per the CR12
d) Proof of membership to a National Oil Spill Contingency Group
e) Clearance letter from Kenya Maritime Authority (KMA) on Compliance with International Oil Pollution Compensation Fund

14. Import, Export and Wholesale of Bitumen-Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports) Work permits Class "G" for foreign directors as per the CR12
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Single Business Permit for the office premises from the County Government

15. Bunkering of Petroleum Products (Except LPG) - Renewal Application

e) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; Legible copies of Identification documents for directors (IDs/passports)
f) Certificate of Incorporation/Business registration certificate
g) Valid tax compliance certificate from Kenya Revenue Authority
h) Work permits Class "G" for foreign directors as per the CR12
i) Single Business Permit for the office premises from the County Government
j) Proof of membership to a National Oil Spill Contingency Group.

16. Export and Wholesale of Petroleum Products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA;
e) Single Business Permit for the office premises from the County Government

17. Export and Wholesale of Jet A1 - Renewal Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
d) Single Business Permit to operate business from the respective County Government
e) Work Permits Class "G" for foreign directors as per CR12
f) Proof of ownership of into plane refueling dispenser or evidence of long-term lease of the equipment (minimum 5 years) from a licensed supplier of Jet A1 at the airport or airstrip of operation.
g) Valid licence for Import, Export and Wholesale of Petroleum Products (Except LPG)
h) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million

18. Storage of petroleum products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Single Business Permit for the office premises from the County Government
e) Work permits Class "G" for foreign directors as per the CR12
f) Proof of undertaking of annual Environmental Audit acknowledgement letter from NEMA
g) Fire clearance certificate from the respective County Government
h) Certificate of registration of workplace from DOSHS
i) Proof of submission of monthly stocks data
j) Valid certificate of Calibration of the petroleum

19. Transport of petroleum products (Except LPG)- Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Valid tax compliance certificate from KRA;
d) Work permits Class "G" for foreign directors as per the CR12
e) Single Business Permit for the office premises from the County Government
f) A valid certificate of calibration for the tanker mounted on each vehicle
g) Fire certificate for the vehicle from the County Government
h) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
i) Logbooks for each prime mover and trailer (Attach lease agreement if not in the name of owner/company)
j) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

20. Transport of by rail (Except LPG) - Renewal Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
d) Single Business Permit to operate business from the respective County Government
e) Work Permits Class "G" for foreign directors as per CR12
f) Scanned original copy of valid mechanical inspection certificate for each wagon
g) Scanned original copy of valid certificate of calibration for each Petroleum Wagon
h) Scanned original copy of fire certificate for each wagon from the County Government
i) Scanned original copy of proof of ownership of each petroleum wagon or lease agreement with owner of the wagons
j) List of locomotive drivers and their certifications
k) Scanned original copy of valid Medical Surveillance certificate for each locomotive driver from DOSHS approved doctors

Annex 2 Requirements for Issuance of LPG Licenses

1. Import, Export and Wholesale of LPG in Bulk - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA;
f) Single Business Permit to for the premises from the County Government

2. Export and Wholesale of LPG in Bulk - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA;
f) Single Business Permit to for the premises from the County Government
g) Letter of intent from a licensed LPG Importer

3. Wholesale of LPG in Cylinders - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA;
f) Single Business Permit to for the premises from the County Government
g) Fire clearance certificate from the respective County Government
h) Certificate of registration of workplace from DOSHS
i) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for distributing cylinders from a licensed LPG cylinder brand owner
j) Proof of cylinder brand ownership registration from Kenya Industrial Property Institute (KIPI)/letter of authority from brand owner
k) Weighing scale calibration certificate from Weights and Measures Department

4. Storage & Filling of LPG in Bulk - New

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies;
b) Certificate of Incorporation/Business registration certificate
c) Valid tax compliance certificate from Kenya Revenue Authority
d) Single Business Permit for the premises from the County Government
e) Legible copies of Identification documents for directors (IDs/passports)
f) Work permits Class "G" for foreign directors as per the CR12
g) Environmental Impact Assessment license from NEMA
h) Fire clearance certificate from the respective County Government
i) Confirmation from Kenya Bureau of Standards that the facility complies with the Kenya Standard (Inspection Report)
j) Certificate of registration of workplace from DOSHS
k) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for filling of cylinders from licensed LPG cylinder brand owners
l) Proof of cylinder brand ownership registration from Kenya Industrial Property Institute (KIPI)/letter of authority from brand owner
m) Weighing scale calibration certificate from Weights and Measures Department
n) Valid calibration certificate (s) for the LPG tank (s)
o) Valid report (s) on Examination of LPG tank (s) from DOSHS approved Inspector

5. Transport of LPG in bulk - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA;
f) Single Business Permit for the office premises from the County Government
g) A valid certificate of calibration for the tanker mounted on each vehicle
h) Fire certificate for the vehicle from the County Government office by Chief Fire Officer
i) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
j) Logbooks for each prime mover and trailer (Attach lease agreement if not in the name of owner/ company)
k) Valid report on examination for LPG tank mounted on each vehicle
l) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

6. Retail of LPG in Cylinders - New Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Certificate of Incorporation / Business Registration Certificate
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
e) Single Business Permit to operate business from the respective County Government
f) Work Permits Class "G" for foreign directors as per CR12
g) Scanned copy of distributorship agreement from LPG Cylinder brand owner or licensed wholesaler
h) Scanned original copy of a valid weighing scale calibration certificate from Weights and Measures department
i) Scanned original copy of a valid fire certificate for the premises from the County Government

7. Retail of LPG in Cylinders - Renewal Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
d) Single Business Permit to operate business from the respective County Government
e) Work Permits Class "G" for foreign directors as per CR12
f) Scanned copy of distributorship agreement from LPG Cylinder brand owner or licensed wholesaler
g) Scanned original copy of a valid weighing scale calibration certificate from Weights and Measures department
h) Scanned original copy of a valid fire certificate for the premises from the County Government

8. Import, Export and Wholesale of LPG in Bulk - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA;
e) Single Business Permit to for the premises from the County Government
f) Proof of annual data submission

9. Export and Wholesale of LPG in Bulk - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA;
e) Single Business Permit to for the premises from the County Government

10. Wholesale of LPG in Cylinders - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies;
b) Identification documents (IDs or Passports) for all the directors;
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA;
e) Single Business Permit to for the premises from the County Government
f) Fire clearance certificate from the respective County Government

11. Storage & Filling of LPG in Bulk - Renewal

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies;
b) Valid Tax Compliance Certificate from Kenya Revenue Authority Single Business Permit for the premises from the County Government Legible copies of Identification documents for directors (IDs/passports) Work permits Class "G" for foreign directors as per the CR12
c) Proof of undertaking of annual Environmental Audit acknowledgement letter from NEMA
d) Fire clearance certificate from the respective County Government Certificate of registration of workplace from DOSHS
e) A valid certificate of weighing scale calibration from Weights and Measures Department Valid calibration certificate (s) for the LPG tank (s)
f) Valid report (s) on Examination of LPG tank (s) from DOSH approved Inspector Proof of importation/ manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/ Authority for filling of cylinders from licensed LPG cylinder brand owners

12. Transport of LPG in bulk - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies;
b) Legible copies of Identification documents for directors (IDs/passports) Work permits Class "G" for foreign directors as per the CR12
c) Valid tax compliance certificate from KRA;
d) Single Business Permit for the office premises from the County Government A valid certificate of calibration for the tanker mounted on each vehicle
e) Fire certificate for the vehicle from the County Government office by Chief Fire Officer A Valid Motor Vehicle Inspection Certificate for each prime mover and trailer
f) Logbooks for each prime mover and trailer (Attach lease agreement if not in the name of owner/ company)
g) Valid report on examination for LPG tank mounted on each vehicle
h) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

13. Driver Certification (Petroleum products including LPG)

a) Valid Tax Compliance Certificate from Kenya Revenue Authority
b) Single Business Permit for the office premises from the County Government Legible copies of Identification documents for directors (IDs/passports) Work permits Class "G" for foreign directors as per the CR12
c) Proof of membership to a National Oil Spill Contingency Group
d) Clearance letter from Kenya Maritime Authority (KMA) on Compliance with International Oil Pollution Compensation Fund

Annex 3: Power System Capacity as at June 2021

Company	Installed Capacity	Effective Capacity
1. KenGen		
a) Hydro Power Plants		
Tana	20.0	20.0
Kamburu	94.2	90.0
Gitaru	225.0	216.0
Kindaruma	72.0	70.5
Masinga	40.0	40.0
Kiambere	168.0	164.0
Turkwel	106.0	105.0
Sondu Miriu	60.0	60.0
Sangoro	21.0	20.0
Small Hydros	11.7	11.2
Hydro Total	**818**	**797**
b) Thermal Power Plants		
Kipevu I Diesel	73.5	60.0
Kipevu 3 Diesel	120.0	115.0
Muhoroni GT	60.0	56.0
Thermal Total	**254**	**231**
c) Geothermal Power Plants		
Olkaria I	45	44
Olkaria II	105	101
Eburru Hill	2.44	2.4
Olkaria Wellhead OW37	5.0	5.0
Olkaria Wellhead OW37 kwg 12	5	5
Olkaria Wellhead OW37 kwg 13	5	5
Olkaria Wellhead OW43	12.8	12.8
Olkaria Wellhead OW905	5	5
Olkaria Wellhead OW914 & OW915	37.8	37.8
Olkaria Wellhead OW919	5	5
Olkaria Wellhead OW39	5	5
Olkaria IV	140	140
Olkaria I units 4 and 5	140	140
Olkaria V	165	158
Geothermal Total	**678**	**666**
d) Wind Power Plants		
Ngong I	11.9	11.9
Ngong II	13.6	13.6
Wind Total	**25.5**	**25.5**
KenGen Total	**1,775**	**1,719**

Company	Installed Capacity	Effective Capacity
1. Government of Kenya (Rural Electrification Programme)		
Off-grid Diesel	28.9	19.5
Off-grid Solar	0.7	0.2
Off-gridWind	0.6	0.0
Total Offgrid	**30.2**	**19.7**
2. Independent Power Producers (IPP) - Thermal & Geothermal		
Iberafrica Diesel	52.5	52.5
Tsavo Diesel	74.0	74.0
Biojoule Kenya Limited	2.0	2.0
Mumias- Cogeneration	26.0	21.5
OrPower 4-Geothermal (1st plant)	63.8	63.8
OrPower 4-Geothermal (2nd plant)	39.6	39.6
OrPower 4-Geothermal (3 rd plant)	17.6	17.6
OrPower 4-Geothermal (4th plant)	29.0	29.0
Rabai Diesel	90.0	88.6
Thika Diesel	87.0	87.0
Gulf Diesel	80.32	80.32
Triumph Diesel	83.0	83.0
Imenti FiT hydro	0.283	0.283
Gikira FiT hydro	0.514	0.514
Genpro Teremi Falls	5.0	5.0
KTDA Gura	2.0	2.0
KTDA Chania	0.5	0.5
Strathmore Solar	0.25	0.25
Lake Turkana Wind Power	310.0	300.0
Garissa Solar	50.0	50.0
Kipeto Wind Power	100	59
Selenkei Solar	40	40
Kianthumbi Hydro	0.51	0.51
IPP Total	**1,153.51**	**1096.51**
3. Imports		
UETCL	0	0
EEPCO	0	0
TANESCO	0	0

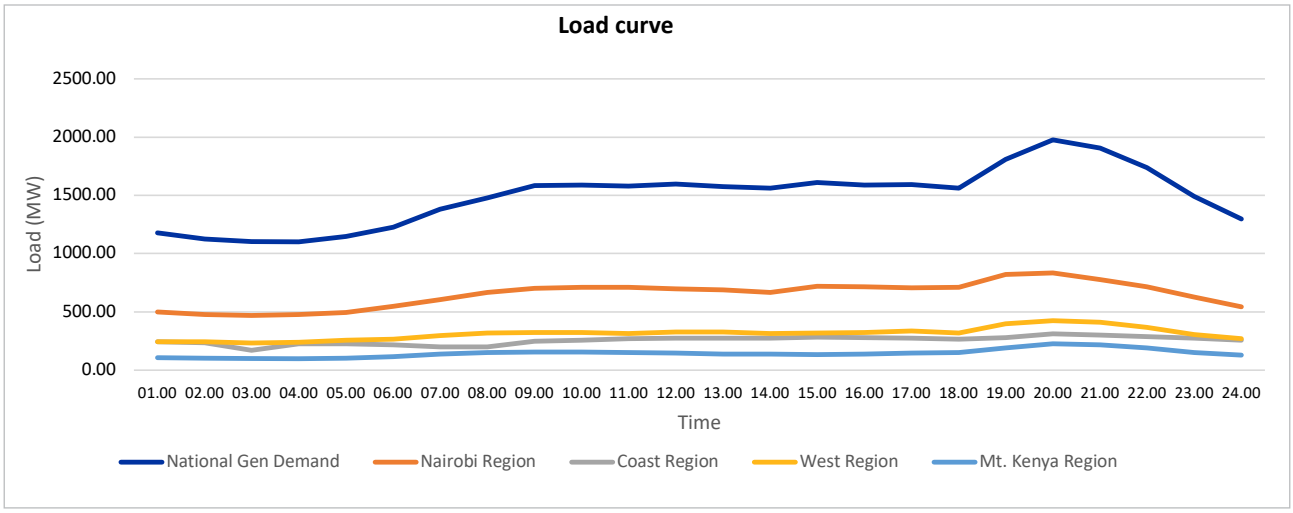
Source: EPRA 2020

Annex 4: Schedule of Electricity Tariffs for 2018/19

Code	Customer Type (Code Name)	Energy Limit kWh/Month	Charge Method	Unit	Approved Charge Rates
DC-L	Domestic-Lifeline	0-100	Energy	Ksh/kWh	10
DC-O	Domestic- Ordinary	> 100	Energy	Ksh/kWh	15.8
SC	Small Commercial	0- 15,000	Energy	Ksh/kWh	15.6
CI1	Commercial/ Industrial	> 15,000	Energy	Ksh/kWh	12
			Demand	Ksh/KVA	800
CI2	Commercial/ Industrial	No. Limit	Energy	Ksh/kWh	10.9
			Demand	Ksh/KVA	520
CI3	Commercial/ Industrial	No. Limit	Energy	Ksh/kWh	10.5
			Demand	Ksh/KVA	270
CI4	Commercial/ Industrial	No. Limit	Energy	Ksh/kWh	10.3
			Demand	Ksh/KVA	220
CI5	Commercial/ Industrial	No Limit	Energy	Ksh/kWh	10.1
			Demand	Ksh/KVA	220
SL	Street Lighting	No Limit	Energy	Ksh/kWh	7.5

Source: EPRA 2020

Annex 5: Load Curves as at 10th December 2020



Source: KPLC 2020

Annex 6: Electric Power Generation Licenses

	Ref No	Licensee	Technology	Location of Power Plant(s)	Capacity (MW)	Date Granted	Duration (Years)	Supply To
1	G1.03.20	Nithi Hydro Power Limited	Hydro	Tharaka Nithi	5.6	13/05/2020	25	Grid
2	G1.01.00	Tsavo Power	Thermal	Mombasa	74	21/03/2000	23	Grid
3	G1.01.15	OrPower4	Geothermal	Naivasha	150	24/11/2000	25	Grid
4	G1.01.05	Iberafrica	Thermal	Nairobi	108.8	20/07/2005	27	Grid
5	G1.06.12	KenGen	Hydro	Kindaruma	72	02/04/2008	25	Grid
6	G1.14.08	Mumias Sugar	Cogeneration (Bagasse)	Mumias	38	24/04/2008	25	Grid
7	G1.15.08	Rabai Power	Thermal	Mombasa	90	15/07/2008	15	Grid
8	G1.02.09	KenGen	Geothermal	Olkaria II	105	02/10/2008	25	Grid
9	G1.03.08	KenGen	Hydro	Turkwel	106	02/10/2008	25	Grid
10	G1.03.12	KenGen	Hydro	Gitaru	225	02/10/2008	25	Grid
11	G1.04.08	KenGen	Hydro	SonduMiriu	60	02/10/2008	25	Grid
12	G1.04.12	KenGen	Hydro	Kamburu	94.2	02/10/2008	25	Grid
13	G1.05.12	KenGen	Hydro	Kiambere	164	02/10/2008	25	Grid
14	G1.09.12	KenGen	Hydro	Wanjii	7.4	02/10/2008	15	Grid
15	G1.11.12	KenGen	Hydro	Sagana	1.5	02/10/2008	18	Grid
16	G1.14.12	KenGen	Geothermal	Olkaria IV	140	02/10/2008	25	Grid
17	G1.14.12	KenGen	Hydro	Masinga	40	02/10/2008	25	Grid
18	G1.15.12	KenGen	Geothermal	Olkaria I	185	02/10/2008	25	Grid
19	G1.01.11	Lake Turkana	Wind	Marsabit	300	16/12/2010	20	Grid
20	G1.02.11	KPRL	MSD	Mombasa	8.5	24/02/2011	20	Captive
21	G1.04.11	KenGen	Thermal, MSD	Kipevu I	60	27/04/2011	20	Grid
22	G1.05.11	KenGen	Thermal, MSD	Kipevu III	120	27/04/2011	20	Grid
23	G1.06.11	KenGen	Gas Turbine	Embakasi	60	27/04/2011	20	Grid
24	G2.01.11	Bidco	Biothermal	Thika	2.125	18/08/2011	20	Grid
25	G1.07.11	Triumph	Thermal	Athi River	83	14/09/2011	20	Grid
26	G1.08.11	GulfPower Ltd	Thermal	Athi River	80	14/09/2011	20	Grid
27	G1.01.12	Thika Power	MSD	Mang'u Area	87	09/02/2012	20	Grid
28	G1.12.12	KenGen	Wind	Ngong I Phase I	5.1	06/12/2012	20	Grid
29	G1.16.12	KenGen	Geothermal	Mobile well-head	5	06/12/2012	15	Grid
30	G1.17.12	KenGen	Geothermal	Mobile well-heads	70	06/12/2012	15	Grid
31	G1.01.14	Cummins	Biomass	Marigat	8.4	29/01/2014	20	Grid
32	G1.02.14	RegenTerem	Hydro	Mt. Elgon	5.2	27/02/2014	20	Grid
33	G1.03.14	QPEA Menen-gai	Geothermal	Nakuru	35	04/12/2014	25	Grid
34	G1.04.14	Sosian-Menen-gai	Geothermal	Nakuru	35	04/12/2014	25	Grid
35	G1.05.14	Tindinyo Falls Resort Limited	Hydro	Nandi	1.5	04/12/2014	25	Grid
36	G1.06.14	Mt Kenya Power	Hydro	Meru	0.6	04/12/2014	25	Grid
37	G1.02.15	Orpower 22	Geothermal	Naivasha	35	16/07/2015	25	Grid
38	G1.03.15	CemtechLtd	Coal	West Pokot	30	16/07/2015	30	Captive

39	G1.04.15	Kleen Energy	Hydro	Embu	6	16/07/2015	25	Grid
40	G1.05.15	Kipeto Energy Limited	Wind	Kajiado	100	16/09/2015	20	Grid
41	G1.06.15	Ol-ndanyat Power Ltd	Wind	Kona Baridi	30	03/12/2015	25	Grid
42	G1.01.16	Kwale International Sugar Co Ltd	Cogen	Kwale	18	25/02/2016	20	Grid and Captive
43	G1.02.16	Chania Power Co Ltd	Hydro	Murang'a	1	30/03/2016	25	Grid
44	G1.03.16	Kirinyaga Pow-er Co Ltd	Hydro	Kirinyaga	1.8	30/03/2016	25	Grid
45	G1.04.16	Greater Meru Tea Power Co Ltd	Hydro	Meru	1.5	30/03/2016	25	Grid
46	G1.05.16	Greater Meru Power Co Ltd	Hydro	Meru	2	30/03/2016	25	Grid
47	G1.06.16	Devki Energy Co Ltd	Coal	Merrueshi	15	25/05/2016	20	Captive
48	G1.07.16	Chemelil Sugar Co Limited	Cogen	Chemelil	3	01/12/2016	25	Captive
49	G1.08.16	Butali Sugar Mills Limited	Cogen	Kakamega	11	01/12/2016	25	Captive
50	G1.01.17	Amu power	Coal	Lamu	1050	03/03/2017	20	Grid
51	G1.02.17	Alten Energy	Solar	Kesses	40	03/03/2017	25	Grid
52	G1.03.17	Radiant Energy	Solar	Kesses	40	03/03/2017	25	Grid
53	G1.04.17	Eldosol Energy	Solar	Kesses	40	03/03/2017	25	Grid
54	G1.05.17	SONY Co. Ltd	Bagasse	Migori	8.7	26/04/2017	20	Captive
55	G1.06.17	Ofgen Power Ltd	Solar	Nairobi & Taita Taveta Counties	0.455	26/04/2017	20	Captive
56	G1.07.17	Strathmore University	Solar	Nairobi	0.6	26/04/2017	20	Grid
57	G1.09.17	Malindi solar	Solar	Malindi	40	26/07/2017	20	Grid
58	G1.10.17	Kengen	hydro	Kisumu	21	26/07/2017	25	Grid
59	G1.11.17	Kengen	GT	Kisumu	30	26/07/2017	20	Grid
60	G1.12.17	Kengen	wind	Ngong	6.8	26/07/2017	25	Grid
61	G1.13.17	Kengen	wind	Ngong	13.6	26/07/2017	25	Grid
62	G1.01.18	Pwani oil prod-ucts limited	Biomass	Kilifi	1.5	24/01/2018	20	Captive
63	G1.02.18	Nzoia Sugar Co. Ltd	Bagasse	Nzoia	7	11/04/2018	20	Captive
64	G1.03.18	Homabay Bio-gas One	Biogas	Homabay	8	11/04/2018	20	Grid
65	G1.04.18	Hydro project services peters Ltd	Hydro	Meru	0.51	11/04/2018	20	Grid
66	G1.05.18	Chania Green Generation Ltd	Wind	Kajiado	50	11/04/2018	20	Grid
67	G1.05.18	Oserian Devel-opment Co.ltd	Solar	Naivasha	1	22/08/2018	20	Captive
68	G1.01.19	Kopere Solar Park Limited	Solar	Nandi	40	30/01/2019	20	Grid

69	G1.02.19	Hannan Arya Energy (K) Limited	Solar	Kajiado	10	27/03/2019	20	Grid
70	G1.01.20	DWA Estate Limited	Biomass	Makueni	1.44	25/03/2020	20	Grid
71	G1.04.20	Kudura Power East Africa Ltd	Solar	Busia	0.03	25/03/2020	10	Mini Grid
72	G1.05.20	Kudura Power East Africa Ltd	Solar	Busia	0.03	25/03/2020	10	Mini Grid
73	G1.06.20	Kudura Power East Africa Ltd	Solar	Busia	0.018	25/03/2020	10	Mini Grid
74	G1.07.20	Kudura Power East Africa Ltd	Solar	Busia	0.03	25/03/2020	10	Mini Grid
75	G1.08.20	Kudura Power East Africa Ltd	Solar	Busia	0.03	25/03/2020	10	Mini Grid
76	G1.09.20	Kudura Power East Africa Ltd	Solar	Busia	0.018	25/03/2020	10	Mini Grid
77	G1.10.20	Kudura Power East Africa Ltd	Solar	Busia	0.06	25/03/2020	10	Mini Grid
78	G1.11.20	Kudura Power East Africa Ltd	Solar	Busia	0.03	25/03/2020	10	Mini Grid
79	G1.02.20	Marco Borero Company Ltd	Solar	Nyeri	1.5	27/05/2020	20	Grid
80	G1.14.20	Kaimosi Tea Estates Ltd	Solar	Nandi	1.5	29/07/2020	20	Captive
81	G1.15.20	Tatu city power company sez limited	Solar	Kiambu	30	02/09/2020	20	Captive
82	G1.16.20	Rareh icon solar limited	Solar	Makueni	30	02/09/2020	20	Grid
83	G1.01.21	Rumuruti Solar Generation Limited	Solar	Laikipia	40	27/01/2021	20	Grid
84	G1.02.21	National Ce-ment Company Limited	Waste Heat Recovery	Merueshi	13.5	15/02/2021	20	Captive
85	G1.03.21	Aperture Green Power Company Limited	Wind	Kiambu	50	31/03/2021	20	Grid
86	G1.05.21	Isiolo Project Limited	Solar PV	Meru	40	31/03/2021	20	Grid
87	G1.08.21	Renewvia Energy Kenya Limited	Solar PV	Kalobeyei Resident Town	0.02	12/04/2021	20	Mini Grid
88	G1.09.21	Renewvia Energy Kenya Limited	Solar PV	Kalobeyei Settlement Village I	0.06	12/04/2021	20	Mini Grid
89	G1.10.21	Ses Microgrids Kenya Limited	Solar PV	Hurri Hills	0.02	12/04/2021	20	Mini Grid
90	G1.11.21	Nal Offgrid Limited	Solar PV	Lolupe	0.022	12/04/2021	20	Mini Grid

Annex 7: Electric Power Transmission and Distribution Licences Granted to KPLC and KETRACO

	Ref No	Name of Licensee	Description of the Undertaking	Date Granted	Duration (Years)
1	TN.01.09	KPLC	Transmission of electrical energy in bulk over the Kenya National Grid, comprising 1,323 km of 220 kV lines and 993 km of 132 kV lines, from the major sources of generation to the transmission substations, together with the interconnection with Ugandan Grid. The sources of generation comprise the Seven Forks hydro power plants, vizMasinga` Kamburu, Kindaruma, Gitaru and Kiambere, Turkwel and SonduMiriu hydro power plants operated by KenGen, the geothermal power plants at Olkaria operated by KenGen and Orpower4 and the thermal power plants at Mombasa operated by KenGen, Tsavo and Rabai Power.	24th Sep 2009	50
2	TN.01.13	KETRACO	Transmission of electrical energy in bulk over the 132 kV, 220 kV, 400kV ac and 500kV HVDC network in Kenya and interconnections with all neighbouring countries	18thJuly 2013	50
3	DS.01.09	KPLC	Distribution in the KPLC Nairobi Region including Nairobi, Kiambu, Limuru, Ruiru, Machakos, Athi River, Kajiado and environs as shown on KPLC drawing Sheet 6 of SK No 10005. Sources of supply comprise generation by MSD at Nairobi South and transmission substations including Juja Road 132/66 kV, Embakasi 220/66 kV, Ruaraka 132/66 kV and Nairobi North 220/66 kV.	24th Sep 2009	50
4	DS.02.09	KPLC	Distribution in the KPLC Mt Kenya Region including Nyeri, Thika, Embu, Meru, Murang'a, Maragua, Kirinyaga, Mbeere, Kitui, Mwingi, Tharaka, Isiolo, Laikipia, and evirons as shown on KPLC drawing Sheet 6 of SK No 10008. Sources of supply comprise embedded hydro generation at Tana, Wanjii, Sagana, Ndula and Mesco, as well as transmission substations at Kiganjo 132/33 kV, Nanyuki 132/33 kV	24th Sep 2009	50
5	DS.03.09	KPLC	Distribution in the KPLC West Region including Nakuru, Kisumu, Eldoret, Kakamega, Baringo, Bomet, Bungoma, Bureti, Busia, Butere, Gucha, Homa Bay, Keiyo, Kericho, Kisii, Kuria, Laikipia, Lugari, Marakwet, Migori, Mt. Elgon, Nandi, Narok, Nyamira, Nyandarua, Nyando, Rachuonyo, Samburu, Siaya, Suba, Trans Mara, Trans Nzoia, Turkana, UasinGishu, Vihiga, West Pokot and evirons as shown on KPLC drawing Sheet 6 of SK No 10005. Sources of supply comprise transmission substations at Naivasha 132/33 kV, Lanet 132/33 kV, Lessos 132/33 kV, Eldoret 132/33 kV, Kisumu 132/33 kV, Muhoroni 132/33 kV, Chemosit 132/33 kV, Musaga 132/33 kV, Webuye 132/33 kV as well embedded hydro generation at Gogo and Sosiani.	24th Sep 2009	50
6	DS.04.09	KPLC	Distribution in the KPLC Coast Region including Mombasa, Malindi, Kilifi, Kwale, Msambweni, Lamu, Voi, TaitaTaveta, Loitotok, MtitoAndei, LungaLunga, Vanga and evirons as shown on KPLC drawing Sheet 7 of SK No 10007. Sources of supply comprise transmission substations at Rabai 132/33 kV, Kipevu 132/33 kV, Bamburi 132/33 kV, Kilifi 132/33 kV, Voi 132/33 kV and MtitoAndei 132/33 kV, as well HSD thermal generation at Lamu and Mpeketoni.	24th Sep 2009	50
7	DS.05.09	KPLC	Distribution in Garissa Town and environs as shown KPLC drawing SK No 04800/A. Source of supply is the Garissa HSD and MSD thermal generation operated by the KenGen.	24th Sep 2009	50
8	DS.06.09	KPLC	Distribution in Lamu Town and environs as shown on KPLC drawing SK No 10007. Source of supply is the Lamu MSD thermal generation operated by the KenGen.	24th Sep 2009	50

Annex 8: Electric Generation, Distribution and/or Retail Supply

	Ref No	Name of Licensee	Technology	Location of Undertaking	Capacity (MW)	Date Granted	Duration (Years)	Supply to
1	GD.01.08	Unilever	Hydro and Thermal	Kericho	4.66	11/12/2008	25	Self
2	GD.01.10	Imenti	Hydro	Imenti Tea Factory	0.92	29/04/2010	25	Self and Grid
3	GD.01.15	Powerhive	Solar PV	Kisii and Nyamira Counties	3	16/02/2015	25	Public
4	GD.02.15	Talek Power Company Ltd	Solar PV-Diesel Hybrid	Talek	0.05	16/09/2015	25	Public
5	GD.03.15	Two Rivers Power Company Ltd	Solar, Diesel & Purchase from KPLC	Nairobi	35 MW purchase from KPLC&2 MW Solar, 10 MW Diesel	16/09/2015	25	Self & Public
6	GD.03.15	Biojoule Kenya Ltd	Biogas	Naivasha, off Moi South Lake Road, Nakuru County	2.6	03/12/2015	25	Self and Grid
7	GD.01.16	Metumi Power Co Ltd	Hydro	Murang'a County	5.6	30/03/2016	25	Self and Grid
8	GD.01.17	Oserian Development Company	Geothermal	Naivasha	3.7	26/04/2017	20	Captive
9	GD.02.17	Nyakwana Power Company ltd	Hydro	Kisii	2	28/06/2017	25	Self and Grid
10	GD.03.17	Gura Power Company Ltd	Hydro	Nyeri	5.8	28/06/2017	25	Self and Grid
11	GD.01.18	Tatu City Power Co. ltd	Grid power	Kiambu	135	26/09/2018	25	Import of Grid power
12	GD.01.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
13	GD.02.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
14	GD.03.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.018	25/03/2020	10	Mini Grid
15	GD.04.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
16	GD.05.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
17	GD.06.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.018	25/03/2020	10	Mini Grid
18	GD.07.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.06	25/03/2020	10	Mini Grid
19	GD.08.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
20	GD.09.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.03	25/03/2020	10	Mini Grid
21	GD.10.20	Kudura Power East Africa Ltd	Solar PV	Busia	0.018	25/03/2020	10	Mini Grid
22	DS.01.21	Renewvia Energy Kenya Limited	Solar PV	Kalobeyei Resident Town	0.02	12/04/2021	20	Mini Grid
23	DS.02.21	Renewvia Energy Kenya Limited	Solar PV	Kalobeyei Settlement Village I	0.06	12/04/2021	20	Mini Grid
24	DS.03.21	SES Microgrids Kenya Limited	Solar PV	Hurri Hills	0.02	12/04/2021	10	Mini Grid

Annex 9: Electric Generation and Retail Supply Licences Issued to Commercial and Industrial Facilities

	Ref No	Licensee	Customer	Technology	Location	County	Capacity (kW)	Date Granted	Duration (Years)
1	CI.004.2021	Cross Boundary Energy Holdings	Xpressions Flora Limited	Solar	Nakuru	Nakuru	0.1392	08/02/2021	20
2	CI.001.2021	Cross Boundary Energy Holdings	Sojanmi Springfield Limited	Solar	Nakuru	Nakuru	0.0939	08/02/2021	20
3	CI.002.2021	Cross Boundary Energy Holdings	Bloom Valley Limited	Solar	Nakuru	Nakuru	0.0496	08/02/2021	20
4	CI.003.2021	Cross Boundary Energy Holdings	Africa Blooms Limited	Solar	Nakuru	Nakuru	0.1415	08/02/2021	20
5	CI.005.2021	Ecoligo Limited	Mutana Holdings Limited	Solar	Vision Plaza off Mombasa Road	Nairobi	0.15	08/02/2021	20
6	CI.006.2021	Ariya Finergy Holdings Limited	Highlands Drink Limited	Solar	Nyeri	Nyeri	0.39	08/03/2021	20
7	CI.007.2021	Enkai Limited	Kiambu Road Investments Limited	Solar	Kiambu	Kiambu	0.25	18/05/2021	10
8	CI.008.2021	Ofgen Limited	New Kenya Cooperative Creameries	Solar	Sotik	Bomet	500	13/08/2021	20
9	CI.009.2021	Lean Energy Solutions Ltd	Lauren International Flowers Ltd	Solar	Murang'a	Murang'a	120	13/08/2021	10

Annex 10: Energy Balances for Kenya 2020

Supply&Consumption in (ktoe)	Coal&Coke ('000 tonnes)	Crude oil('000 tonnes)	Petroleum Products ('000 tonnes)	Gas('000 tonnes)	Nuclear	Hydro ('000 tonnes of oil equivalent)	Geothermal, solar, wind etc ('000 tonnes of oil equivalent)	Combustible Renewables and waste (Ktoe)	Electricity(ktoe)	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	358.27	549.35	16,959.69	-	-	17,867.31
Imports	837.50	0.00	6,045.57	-	0.00	0.00	-	-	117.60	-	7,000.67
Exports	1.01	-	-879.00	-	0.00		-	-	14.21	-	-863.78
International Marine Bunkers**	-	-	1.14	-	0.00		-	-		-	1.14
International Aviation Bunkers**	-	-	-420.19	-	0.00	-	-	-	-	-	-420.19
Stock Changes	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Total Primary Energy Supply(TPES)	**836.49**	**0.00**	**4,747.52**		**0.00**	**358.27**	**549.35**	**16,959.69**	**131.81**		**23,583.13**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	281.85	0.00	-3,459.34	0.00	0.00	-	-	0.00	-239.95	-	-3,417.44
	-	-	-	0.00	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-64.89	0.00	0.00	-364.01	-557.26	0.00	997.91	-	11.75
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,678.23	-	-	-5,678.23
Own Use	-	0.00	0.00	-	0.00	-	-	-	-21.95	-	-21.95
Distribution Losses	-	-	-	-	0.00	-	-	-	-240.00	-	-240.00
Total Final Consumption(TFC)	**1,118.34**	**0.00**	**1,223.30**	**0.00**	**0.00**	**-5.74**	**-7.92**	**11,281.46**	**627.81**	-	**14,237.25**
					0.00						
Industry& commercial sector	**1,118.34**	**0.00**	**129.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**305.54**	**0.00**	**1,553.16**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**1,060.45**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1,060.45**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	102.68	-	0.00	-	-	-	-	-	102.68
Road transport &retail pump outlets	-	-	954.50	-	0.00	-	-	-	-	-	954.50
Rail transport	-	-	2.98	-	0.00	-	-	-	-	-	2.98
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	0.29	-	0.00	-	-	-	-	-	0.29
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**33.63**	**0.00**	**0.00**	**0.00**	**0.00**	**11,281.46**	**278.61**	**0.00**	**11,593.69**
Residential	-	-	0.00	-	0.00	-	-	11,281.46	273.29	-	11,554.75
Government	-	-	5.62	-	0.00	-	-	-	-	-	5.62
Agriculture/ Forestry	-	-	6.48	-	0.00	-	-	-	-	-	6.48
Tourism	-	-	1.70	-	0.00	-	-	-	-	-	1.70
Power generation	-	-	19.82	-	0.00	-	-	-	-	-	19.82
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	5.32	-	5.32
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: KNBS, EPRA Calculations and other Various Sources

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CONTACT US

Energy and Petroleum Regulatory Authority,
Eagle Africa Center, Longonot Rd, Upperhill
P.O Box 42681-00100 GPO, Nairobi – Kenya
Tel: +254-20-2847000/200/2717675
Cell: +254-722 200947/734414333
Hotline: +254 709 336 000/708 444 000
Fax: +254 20 2717603
Email: info@epra.go.ke
Website: www.epra.go.ke

EPRA Kenya

@EPRA_Ke